F.Sc

12

According to Smart Syllabus 2020
Accelerated Learning Programme (ALP)

AZEEM **10 BOARDS**

SOLVED PAST PAPERS SERIES

PHYSICS

LAHORE

GUJRANWALA

MULTAN

FAISALABAD

RAWALPINDI

BAHAWALPUR

SARGODHA

D.G. KHAN

SAHIWAL

A.J.K.

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SECTION I

MULTIPLE CHOICE QUESTIONS

Chapter 12

ELECTROSTATICS

From Punjab Boards:-

1) **The concept of electric field lines is introduced by:** **(LHR 2015 GII)**
   (a) Coulomb (b) **Faraday**
   (c) Einstein (d) Joseph Henry

2) **If a charged body is moved against the electric field, it will gain:** **(LHR 2016) (MUL 2016) (FAS 2014)**
   (a) P.E (b) K.E
   (c) Mechanical energy
   (d) **Electrical potential energy**

3) **If an electron of charge 'e' is accelerated through a potential difference V, it will acquire energy:** **(LHR 2017)**
   (a) **Ve** (b) V/2
   (c) E/V (d) Ve^2

4) **The product of resistance and capacitance is:** **(GUJ 2015)**
   (a) Velocity (b) Force
   (c) Acceleration (d) **Time**

5) **The increase in capacitance of a capacitor due to presence of dielectric is due to ________ dielectric.** **(GUJ 2012)**
   (a) **Electric polarization**
   (b) Electrification
   (c) Ionization (d) Electrolysis

6) **Electric intensity inside the hollow sphere is:** **(GUJ 2015)**
   (a) $\frac{\sigma}{\varepsilon_o}$ (b) $\frac{\sigma}{2\varepsilon_o}$
   (c) $\frac{1}{\varepsilon_o}$ (d) **Zero**

7) **The quantity $\Delta V/\Delta r$ is called:** **(MUL 2015 GII)**
   (a) Electric potential (b) Electric energy
   (c) Potential barrier (d) **Potential gradient**

8) **A 5M Ω resistor is connected with a 2μC capacitor. The time constant of the circuit is:** **(MUL 2012 Supply)**
   (a) 0.1s (b) 1s
   (c) 2.5s (d) **10s**

9) **Farad is the unit of:** **(MUL 2012 Supply)**
   (a) Charge (b) Current
   (c) Electric flux (d) **Capacitance**

10) **SI unit of electric flux is:** **(MUL 2015 GII)**
   (a) Nmc^{-1} (b) $Nm^{-1}c^{-1}$
   (c) Nm^2c^{-1} (d) Nm^3c^{-2}

11) **Sec/ohm is equal to:** **(MUL 2012)**
   (a) **Farad** (b) Coulomb
   (c) Joule (d) :Ampere

12) **Millikan and Flecher could determine the charge on oil droplets in:** **(MUL 2012)**
   (a) Thermal Equilibrium
   (b) **Electrical Equilibrium**
   (c) Mechanical Equilibrium
   (d) Unstable Equilibrium

13) **One Joule is equal to:** **(MUL 2016)**
   (a) 1.6×10^{-19}eV (b) 1.6×10^{19} eV
   (c) 6.25×10^{-18} eV (d) **6.25×10^{18} eV**

14) **Capacitance of parallel plate capacitor is:** **(MUL 2016)**
   (a) $\frac{\varepsilon_0 d}{A}$ (b) **$\frac{\varepsilon_0 A}{d}$**
   (c) $\frac{A}{\varepsilon_0 d}$ (d) $\frac{d}{\varepsilon_0 A}$

15) **If a charged body is moved against the electric field it will gain:** **(MUL 2017)**
   (a) Elastic Potential Energy
   (b) Kinetic Energy
   (c) Gravitational Energy
   (d) **Electric Potential Energy**

16) **Coulomb/volt is called:** **(MUL 2017)**
   (a) **Farad** (b) Ampere
   (c) Joule (d) Henry

17) **If the potential difference across two plates of a parallel plate capacitor is doubled then energy stored in it will be:** **(BAH 2014) (FAS 2014)**
   (a) Two times (b) Eight times
   (c) **Four times** (d) Remains sa...

18) Total flux through a closed surface depends on: (MUL 2015)

(a) Shape of surface (b) Charge enclosed only
(c) Medium only (d) Charge and medium

19) Under the action of electric field, molecules of a dielectric: (MUL 2012)

(a) Begin to vibrate (b) Become electric dipole
(c) Are ionized (d) Are charged

20) An ECG records the ---------------- between points on human skin generated by electric process in the heart: (MUL 2016)

(a) Heart Beat (b) Pulse Rate
(c) Pressure (d) Voltage

21) SI unit of electric flux is: (FAS 2013)

(a) NC^{-1} (b) Nm^2C^{-1}
(c) Weber (d) Tesla

22) Charge on an electron is: (FAS 2015)

(a) $1.6 \times 10^{-19}C$ (b) 1.6
(c) $1.6 \times 10^{-9}C$ (d) None

23) Electron volts is the unit of: (FAS 2015, 2016)

(a) Potential (b) Potential difference
(c) Electric current (d) Electric energy

24) What does Nm^2C^{-1} stand for quantity? (FAS 2012)

(a) Electric field (b) Electric potential
(c) Electric flux (d) Electric force

25) The electric field lines are closer where the field is: (FAS 2016)

(a) Strong (b) Weak
(c) Uniform (d) Variable

26) Charge on an electron is: (FAS 2016)

(a) $1.6 \times 10^{-19}C$ (b) $1.6 \times 10^{+19}C$
(c) 9.1×10^{-19} (d) $9.1 \times 10^{-27}C$

27) The Product of resistance and capacitance is equal to: (FAS 2017)

(a) Velocity (b) Force
(c) Acceleration (d) Time

28) When a dielectric is placed between two charges, then coulomb's force will be: (RAW 2014)

(a) Increased (b) Decreased
(c) Zero (d) Negative

29) A capacitor stores energy in the form of: (RAW 2014)

(a) Magnetic field (b) Heat energy
(c) Electrical energy (d) Mechanical energy

30) Unit of energy density of electric field is: (SAG 2013 GII)

(a) JC^{-1} (b) JV^{-1}
(c) Jm^{-3} (d) J^{1-3}

31) The term 'RC' has same unit as that of: (SAG 2013 GII)

(a) Rotential (b) Capacitance
(c) Energy (d) Time

32) Coulomb per volt is called: (SAG 2012)

(a) Farad (b) Ampere
(c) Joule (d) Ohm

33) 1 joule = (SAG 2012)

(a) 6.25×10^{18} e.v (b) 6.25×10^{-18} e.v
(c) 1.6×10^{-19} e.v (d) 9.1×10^{-11} e.v

34) How many electrons will have a charge of one coulomb? (SAG 2013 GI)

(a) 6.2×10^{18} (b) 6.2×10^{19}
(c) 5.2×10^{18} (d) 5.2×10^{19}

35) Energy stored in the capacitor with dielectric is (SAG 2017)

(a) $\frac{1}{2}\Sigma_r \Sigma_o E^2 Ad$ (b) $\Sigma_o AE$
(c) $\frac{\Sigma_o A}{d}$ (d) $\frac{1}{2}\Sigma_r \Sigma_o E^2$

36) In SI units, the value of permittivity of free space a (ε_o) is (SAG 2017) (RAW 2017)

(a) $9\times10^9 Nm^2 Cm^{-2}$ (b) $9\times10^{-9} C^2 N^{-1} m^{-2}$
(c) $8.85\times10^{12} C^2 N^{-1} m^{-2}$ (d) $8.85\times10^{-12} C^2 N^{-1} m^{-2}$

37) The direction of field lines around an isolated negative charge " – q " is (SAG 2017)

(a) Radially inward (b) Radially outward
(c) Elliptical (d) Circular

38) A positively charged particle or certain mass may be held suspended (at rest) in electric field of suitable strength if the field is directed: (DGK 2015 GII)

(a) Outward (b) Inward
(c) Upward (d) Downward

39) When dielectric material is placed in an electric field it: (RAW 2013 GII)

(a) Conducts (b) Exhibit electric charge
(c) Undergoes electrolysis
(d) Becomes polarized

40) The product of resistance and capacitance is equal to: (RAW 2015 GII)

(a) Force (b) Time
(c) Velocity (d) Current

41) The charging time of capacitor depends upon: (RAW 2013 GII)
(a) R/C (b) C/R
(c) **R × C** (d) $\sqrt{RC}$

42) Electric flux through a closed surface does not depend upon: (RAW 2014 GII)
(a) **Its shape** (b) Medium
(c) Charge (d) None of these

43) Two equal and opposite point charges separated by a distance 2d. the electric potential at the midway between them is: (RAW 2012 GII)
(a) **Zero** (b) High
(c) Low (d) Constant

44) Energy density in case of a capacitor is always proportional to: (RAW 2012 GII)
(a) ε_o (b) E^2
(c) V^2 (d) **ε^2**

45) For computation of electric flux, the surface area should be: (RAW 2015 GII) (SAW 2016)
(a) Parallel (b) **Flat**
(c) Curved (d) Spherical

46) When an RC circuit is connected across a battery, amount of charge deposited on plates is .... times the equilibrium charge after one time constant: (RAW 2012 GI)
(a) **0.63** (b) 0.67
(c) 0.75 (d) 0.86

47) The idea for electric field lines was proposed by: (RAW 2017)
(a) Henry (b) **Michael Faraday**
(c) Ampere (d) Ohm

48) When some dielectric is inserted between the plates of a capacitor, then capacitance: (SAW 2014)
(a) **Increased** (b) Decreased
(c) Zero (d) Infinity

49) When an insulating medium as placed between two charges, the electrostatic force is: (SAW 2013)
(a) Increased (b) Zero
(c) **Decreased** (d) Same

50) The electron volt is the unit of: (SAW 2016)
(a) electric current (b) **electric energy**
(c) potential (d) potential difference

51) The unit of electric intensity other than NC^{-1} is: (LHR 2018)
(a) $\frac{V}{A}$ (b) **$\frac{V}{m}$**
(c) $\frac{V}{C}$ (d) $\frac{N}{V}$

52) The value of e/m is smallest for: (LHR 2018)
(a) **Proton** (b) Electron
(c) β-particle (d) Positron

53) The electric filed created by positive point charge is: (LHR 2018)
(a) Radially inward (b) Zero
(c) Circular (d) **Radially outward**

54) Two oppositely charge balls A and B attract the third ball C, when placed near them turn by turn. The third ball C must : (LHR 2018)
(a) Positively charge (b) Negatively charge
(c) **Electrically neutral**
(d) Positively and negatively charged

55) The electric potential at a mid-point in an electric dipole is: (LHR 2018)
(a) **0 V** (b) 0.5 V
(c) 1 V (d) 1.5 V

56) If time constant in RC series circuit is small, then capacitor is charged: (MUL 2018)
(a) Slowly (b) **Rapidly**
(c) At constant rate (d) Intermittently

57) Electric Flux is expressed as: (BAH 2018)
(a) $\phi_e = \vec{E} \times \vec{A}$ (b) $\phi_e = \vec{E} + \vec{Q}$
(c) **$\phi_e = \vec{E} \cdot \vec{A}$** (d) $\phi_e = EA^2$

58) Coulomb per Volt is called: (BAH 2018)
(a) **Farad** (b) Ampere
(c) Joule (d) Henry

59) The capacitance of capacitor depends upon: (FAS 2018)
(a) Thickness of plates (b) charges on the plates
(c) Voltage applied (d) **Geometry of the capacitor**

60) A billion electrons are added to pith ball. Its charge is: (FAS 2018)
(a) $-1.6 \times 10^{-10}C$ (b) **$-1.6 \times 10^{-12}C$**
(c) $-1.6 \times 10^{-14}C$ (d) $-1.6 \times 10^{-7}C$

61) If electric lines of force are equally spaced the electric field is: (RAW 2018)
(a) **Uniform** (b) Non-uniform
(c) Weak (d) Strong

62) Two electrons fall through a potential difference of 3 volts, energy gained is: (SAG 2018)
(a) 1.6×10^{-19} J (b) 9.6×10^{-19} eV
(c) 3eV (d) 6 eV

63) **RC factor has same dimensions as that of:** (SAG 2018)

(a) Potential difference (b) Resistance

(c) Time (d) Capacitance

64) **If electric and gravitational forces on an electron balance each other, then electric intensity will be:** (SAG 2018)

(a) $E = \frac{mg}{q}$ (b) $E = \frac{q}{mg}$

(c) $E = \frac{F_e}{q}$ (d) $E = \frac{1}{4\pi\epsilon_0}\frac{q}{r^2}$

65) **Gauss's law can only be applied to:** (DGK 2018)

(a) A curved surface (b) A flat surface

(c) A surface of any shape

(d) A closed surface

66) **If time constant in RC Circuit is small, than the capacitor is charged or discharged:** (DGK 2018)

(a) Slowly (b) Rapidly

(c) At constant rate (d) Intermittently

67) **Product of resistance and capacitance is:** (DGK 2018)

(a) Velocity (b) Force

(c) Acceleration (d) Time

68) **In Millikan's oil drop experiment a charged particle of mass 'm' is in equilibrium in an electric field $\vec{E}$. If the direction of electric field is reversed, then acceleration of the particle will be:** (SAH 2018)

(a) zero (b) g/2

(c) g (d) 2g

69) **The net charge on a capacitor (each plate having magnitude of charge q) is:** (SAH 2018)

(a) Infinity (b) 2 q

(c) q/2 (d) zero

70) **Which material should be inserted between the plates of a capacitor in-order to increase its capacitance?** (SAH 2018)

(a) copper (b) mica

(c) iron (d) tin

71) **If a charged body is moved against the electric field, it will gain:** (LHR 2019 GI)

(a) P.E. (b) K.E.

(c) Mechanical energy

(d) Electrical potential energy

72) **Sec/Ohm is equal to:** (LHR 2019 GI)

(a) Farad (b) Coulomb

(c) Joule (d) Ampere

73) **The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}m^{-1}$ then the unit of $\frac{E}{B}$ is:** (LHR 2019 GI)

(a) ms^{-2} (b) ms

(c) $m^{-1}s^{-1}$ (d) ms^{-1}

74) **It is required to suspend a proton of charge 'q' and mass 'm' in an electric field the strength of the field must be:** (LHR 2019 GI)

(a) $E = \frac{mg}{qv}$ (b) $E = \frac{mg}{q}$

(c) $E = \frac{q}{mg}$ (d) $E = \frac{qv}{B}$

75) **Which of the following relation is correct?** (RAW 2019 GI)

(a) joule = volt x ampere

(b) joule = coulomb / volt

(c) joule = volt / ampere

(d) joule = coulomb × volt

76) **A rubber ball of radius 2cm has a charge of 5μc on its surface, which is uniformly distributed, the value of $\vec{E}$ at its centre is:** (RAW 2019 GI)

(a) $10NC^{-1}$ (b) Zero

(c) $2.5\ NC^{-1}$ (d) $5 \times 10^{-6}\ NC^{-1}$

77) **A particle carrying a charge of 2e falls through a potential difference of 3V. The energy acquired by it is:** (MUL 2019 GI)

(a) 9.6×10^{-18} J (b) 9.6×10^{-19} J

(c) 1.6×10^{-19} J (d) 9.6×10^{-17} J

78) **A charge of 10^{-10} C between two parallel plates 1 cm apart experience a force of 10^{-5}N. The p.d. between the plates is:** (SAG 2019 GI)

(a) 10 V (b) 10^2 V

(c) 10^3 V (d) 10^4 V

79) **Equation $\phi = \bar{E} . \bar{A}$ is applicable to the surface:** (DGK 2019 GI)

(a) Cylindrical (b) Conical

(c) Flat (d) Spherical

80) **What is the force on a proton placed between two parallel plates containing equal positive charges:** (SAW 2019 GI)

(a) Zero (b) $2.6\ 10^{-19}$ N

(c) 9×10^{-19} N (d) 5×10^{-19} N

ENTRY TEST MCQ'S

1) An electric charge in uniform motion produces: (2008)

(a) An electric field
(b) A magnetic field
(c) Both magnetic and electric field
(d) Neither magnetic nor electric field

2) The work done in moving a unit positive charge from one point to another against the electric field is a measure of: (2009)

(a) Capacitance
(b) Potential difference between two point
(c) Intensity of electric field
(d) Resistance between two points

3) In Millikan's Method, the radius of droplet can be calculated by: (2009)

(a) $r = \sqrt{\frac{q v_t}{2\rho g}}$ (b) $r^2 = \frac{9\eta v_t}{\rho g}$
(c) $r^2 = \frac{9\eta v_t}{2\rho g}$ (d) $r = \frac{9\eta v_t}{2\rho g}$

4) The electrical analog of mass in electricity is ________. (2010)

(a) Capacitance (b) Inductance
(c) Charge (d) Resistance

6) Electric intensity is a vector quantity and its direction is: (2010)

(a) Perpendicular to the direction of field
(b) Oppsoite to the direction of force
(c) At a certain angle
(d) Along the direction of force

7) The magnitude of an electric field between wo separated plates can be calculated by the relation: (2010)

(a) $\Delta V = Ed$ (b) $\Delta V = \frac{E}{q_o}$
(c) $\Delta V = \frac{E}{d}$ (d) $E = \frac{d}{\Delta V}$

8) SI unit of electric flux is: (2010)

(a) NmC^{-1} (b) $Nm^{-2}C^{-2}$
(c) Nm^2C^{-2} (d) Nm^2C^2

9) If 2 A current passes through a resistor when connected to a certain battery. If the resistance is replaced by the double resistance, then the current will become: (2011)

(a) 2 A (b) 4A
(c) 6 A **(d) 1A**

10) Electric charge on an object is measured as 5 micro coulombs. How the value of this charge can be expressed in terms of base units: (2012)

(a) 5 × 100 ampere second
(b) 5×10^{-6} ampere second
(c) 5×10^{-6} coulomb second
(d) 5 × 100 coulomb second

11) What will be the effect on the capacitance of a capacitor if area of each plate is doubled while separation between the plates is halved? (2012)

(a) Capacitance remains same
(b) Capacitance becomes double
(c) Capacitance becomes four times
(d) Capacitance reduces to half

12) 10 V potential difference is applied across the plate of 1 μF capacitor. What is the energy storied in capacitor? (2012)

(a) 0.5 mJ **(b) 0.05 mJ**
(c) 5 mJ (d) 50 mJ

13) What is the charge stored on a 5 μF capacitor charged to potential difference of 12 V? (2013)

(a) 60 μC (b) 2.4 C
(c) 2.4 μC (d) 60 C

14) The difference between the plates of a parallel plate capacitor is 2.0 mm and area of each plate is 2.0 m^2. The plates are in a vacuum. A potential difference of 1.0×10^4 V is applied across the plates. Find the capacitance. (2014)

(a) 4×10^{-3} F (b) 3.54×10^{-9} F
(c) 8.85×10^{-9} F (d) 9.0×10^{-9} F

15) The unit for electric charge is Coulomb and one Coulomb in terms of base unit is equivalent to: (2016)

(a) Am (b) Js^{-1}
(c) As (d) C

16) If the length, width and separation between the plates of a parallel plate capacitor is doubled then its capacitance becomes: (2016)

(a) Double (b) Half
(c) Four-times (d) Eight-times

15. State Gauss's Law. How can you apply the Gauss's Law to calculate Electric Intensity due to an infinite sheet of charge? **(MUL 2017) (DGK 2012)**
16. Define Absolute Electric Potential. Derive its relation due to a point charge. **(MUL 2017)**
17. What is capacitor? Give its unit. Evaluate the capacitance of parallel plate capacitor having dielectric between its plates. **(MUL 2012) (RAW 2019 GI)**
18. (a)State gauss's law and find electric intensity due to an infinite sheet of charge by applying Gauss's law. **(MUL 2016)**
19. Define electric flux. Calculate the electric flux through a closed surface enclosing a charge "q" at its centre. **(MUL 2012) (DGK 2017)**
20. What is a capacitor? Derive relation for the energy density in terms of electric field in the capacitor. **(MUL 2015) (SAG 2018)**
21. Define electric potential. Calculate the electric at a point due to a point charge. **(MUL 2013)**
22. What is capacitor? Find the capacitance of parallel plate capacitor. **(MUL 2016)**
23. Define electric flux. Calculate the electric flux through a sphere having a charge (+q) at its center. **(RAW 2017)**
24. Define electric potential. Derive on equation for electric potential at a point due to a point charge. **(RAW 2017) (MUL 2019 GI)**
25. Two opposite point charges, each of magnitude q are separated by a distance 2d. What is the electric potential at a point P midway between them. **(SAG 2013 G-I) (DGK 2015)**
26. Define electric flux. Derive the expression for electric flux through a surface enclosing a charge. **(SAG 2012)**
27. Define capacitor and capacitance. Derive the formula for energy stored in a capacitor. **(SAG 2017, 2019 GI) (SAW 2016)**
28. Define electric potential at a point due to point charge and derive mathematical expression for it. **(SAG 2017)**
29. Describe the Millikan's Method to find the charge on an electron. **(DGK 2014 G-II) (SAW 2014)**
30. Define capacitance and derive the expression for capacitance of parallel plate capacitor without dielectric and with dielectric between the plates. **(DGK 2012 G-I, 2013 G-II) (SAH 2018)**
31. The time constant of a series RC circuit is $t = RC$. Verify that an ohm times farad is equivalent to second. **(SAW 2013)**
32. A proton is placed in uniform electric field of $5000NC^{-1}$, directed to right is allowed to go through a distance of 10cm. Calculate P.D between two points, work done and velocity. **(BAH 2018)**
33. What is Gauss's law. Apply it to find electric intensity between two oppositely charged parallel plates. **(LHR 2019)**

Chapter 13
CURRENT ELECTRICITY

From Punjab Boards:-

1) If the resistance of 500Ω have fourth band of silver colour then its upper maximum resistance will be: **(LHR 2015 GII)**
(a) 600Ω (b) **550Ω**
(c) 450Ω (d) 400Ω

2) The velocity of an oscillating change as it moves to and from along a wire is: **(LHR 2015 GI)**
(a) Changing (b) **Constant**
(c) Infinite (d) Zero

3) Specific resistance of a material depends upon: **(LHR 2015 GI)**
(a) Length (b) Area
(c) Temperature (d) Both A & B

4) Heat generated by a 40 watt bulb in one hour is: **(LHR 2017)**
(a) 4800 J **(b) 144000 J**
(c) 44000 J (d) 1440 J

5) With the rise in temperature, the conductivity of semi-conductor material: **(LHR 2017)**
(a) Increases linearly **(b) Decreases linearly**
(c) Increases exponentially
(d) Decreases exponentially

6) The numerical value of black colour in carbon resistors is: **(LHR 2017)**
(a) 0 (b) 1
(c) 2 (d) 3

7) The potential difference between the head and tail of an electric eel is: **(MUL 2015 GI)**
(a) 600 volts (b) 700 volts
(c) 800 volts (d) 900 volts

8) When a wire of resistance R is cut into two equal parts its resistance becomes R/2. What happens to resistivity? **(MUL 2014 GI)**
(a) Double **(b) Same**
(c) Half (d) One fourth

9) In Carbon resistor, the value of Blue Colour is: **(MUL 2015 GII)**
(a) 7 **(b) 6**
(c) 8 (d) 9

10) If a resistor is traversed in the opposite direction of current then the change in potential is: **(MUL 2012)**
(a) Zero (b) Negative
(c) Positive (d) Constant

11) If fourth band on a carbon resistor is of silver colour then its tolerance is: **(BAH 2012)**
(a) ± 1% (b) ± 5%
(c) ± 10% (d) ± 20%

12) mho - m^{-1} is the unit of: (BAH 2014)
(a) Resistance (b) Resistivity
(c) Conductance (d) Conductivity

13) A certain wire has a resistance R, the resistivity of an identical material with the first, except for twice its diameter is: (BAH 2016)
(a) $\frac{1}{4}$R (b) 4R
(c) 2R (d) Same as R

14) Kirchoff's first rule is the manifestation of the law of conservation of: (FAS 2014) (SAW 2014)
(a) Mass (b) Charge
(c) Energy (d) Momentum

15) For an open circuit, the current flowing through circuit will be: (FAS 2012 , 2016)
(a) Infinite (b) Finite
(c) Maximum (d) Zero

16) The thermistors convert changes of temperature into: (FAS 2015)
(a) Light energy (b) Electric voltage
(c) Heat (d) Sound

17) A wire of uniform area of cross-section 'A' and length 'L' is cut into two equal parts. The resistivity of each part is: (FAS 2013)
(a) Doubled (b) Half
(c) Remains the same (d) Increase three times

18) The relation of emfs of two cells $\frac{E_1}{E_2}$ is = :(FAS 2016)
(a) $\frac{\ell_2}{\ell_1}$ (b) $\frac{\ell_1}{\ell_2}$
(c) $\frac{1}{\ell_1\ell_2}$ (d) ℓ_1, ℓ_2

19) Heat sensitive resistors are called: (FAS 2017)
(a) Resistors (b) Capacitors
(c) Thermistors
(d) Inductors

20) A rheostat can operate as: (RAW 2017)
(a) Amplifier (b) Potential divider
(c) Oscillator (d) Transformer

21) The terminal potential difference of a battery of internal resistance 'r' and emf: (SAG 2012)
(a) $V = \varepsilon + Ir$ (b) $V = \varepsilon - Ir$
(c) $V = \frac{\varepsilon - r}{I}$ (d) $\frac{1}{\varepsilon - r}$

22) The colour of strips on a carbon resistor from extreme left are yellow, black and red respectively its resistance is: (SAG 2013 GII)
(a) 4KΩ (b) 400Ω
(c) 40Ω (d) 40KΩ

23) Resistance tolerance of silver band is (SAG 2017)
(a) +5 % (b) +6 %
(c) +7 % (d) +10 %

24) Temperature co-efficient of resistivity is measured in: (DGK 2014 GI)
(a) Ω − k (b) Ω − m
(c) k^{-1} (d) k

25) In colour code of resistance orange colour represents: (DGK 2012 GI)
(a) 0 (b) 1
(c) 2 (d) 3

26) If a resistor of resistance R is connected across a battery of internal resistance 'r' then output power will be maximum when: (BAH 2016)
(a) R = ¼ r (b) R = r
(c) R = 2. r (d) R = 4r

27) The reciprocal of resistance is called: (BAH 2015 GII)
(a) Capacitance (b) Resistance
(c) Conductance (d) Inductance

28) The wire of resistance R is cut into two equal parts, the resistance of each part becomes $\frac{R}{2}$, what happens to its resistivity. (BAH 2017)
(a) Becomes double (b) Remains same
(c) Becomes half (d) Becomes 4 times

29) If fourth band is missing on resistance, its tolerance is: (SAW 2016)
(a) ± 5 (b) ± 10%
(c) ± 15% (d) ± 20%

30) mho m^{-1} is the SI unit of: (LHR 2018)
(a) Conductance (b) Conductivity
(c) Resistance (d) Resistivity

31) Resistance tolerance for gold colour is: (LHR 2018)
(a) 50 % (b) 30 %
(c) 20 % (d) 5 %

32) The potential difference between the head and tail of an electric eel can be up to: (MUL 2018)
(a) 500 V (b) 600 V
(c) 700 V (d) 800 V

33) What is the colour code for 52 MΩ ± 5% resistance: (BAH 2018)
(a) Red Green Blue Gold
(b) Green Red Blue Gold
(c) Yellow Red Blue Gold
(d) Green Red Violet Gold

34) What is the resistance of a carbon resistor which has bands brown, black and brown: (BAH 2018)
(a) 100 Ohm (b) 1000 Ohm
(c) 10 Ohm (d) 1.0 Ohm

35) The current through a resistance of 100Ω when connected across a source of 220V is: (FAS 2018)
(a) 22000A (b) 22A
(c) 2.2A (d) 0.45A

36) The reciprocal of resistance is called: (SAG 2018)
(a) Reactance (b) Inductance
(c) Conductance (d) Conductivity

37) A 100 W bulb is switched on for half an hour. Heat lost due to flow of current is: (SAG 2018)
(a) 0.36 MJ (b) 18 MJ
(c) 3 KJ **(d) 0.18 MJ**

38) Kirchhoff's second rule is based on: (DGK 2018)
(a) Energy conservation
(b) Mass conservation
(c) Charge conservation
(d) Momentum conservation

39) The maximum power is delivers to a load resistance 'R' when the internal resistance of the source is: (DGK 2018)
(a) Zero (b) Infinite
(c) Equal to 'R' (d) Equal to $\frac{R}{Z}$

40) An ideal current source shall have resistance: (SAH 2018)
(a) zero (b) finite but not zero
(c) infinite
(d) Depends upon requirement

41) When a wire of resistance R is cut into two equal parts then resistance of each wire is: (LHR 2019 GI)
(a) Double **(b) Half**
(c) Remain same (d) One forth

42) The value of charge on 1.0×10^7 electrons is: (LHR 2019 GI)
(a) 1.6×10^{-12} C (b) $1.6 \times 10^{+11}$ C
(c) 1.6×10^{-19} C (d) $1.6 \times 10^{+19}$ C

43) In carbon resistors, which colour band indicates the tolerance of $\pm 10\%$? (RAW 2019 GI)
(a) White **(b) Silver**
(c) Gold (d) Violet

44) For an open circuit, terminal potential difference 'Vt' is: (RAW 2019 GI)
(a) Vt = 2emf **(b) Vt=emf**
(c) Vt > emf (d) Vt < emf

45) Kirchhoff's 2^{nd} rule is a manifestation of law of conservation of: (MUL 2019 GI)
(a) Energy (b) Charge
(c) Mass (d) Momentum

46) Tolerance for silver colour is: (SAG 2019 GI)
(a) $\pm 10\%$ (b) $\pm 15\%$
(c) $\pm 20\%$ (d) $\pm 5\%$

47) During danger the "eel" turns itself into a living battery then the potential difference between its head and tail can be up to: (DGK 2019 GI)
(a) 160 V (b) 220 V
(c) 440 V **(d) 600 V**

48) Siemen is the unit of: (DGK 2019 GI)
(a) Resistivity (b) Resistance
(c) conductivity **(d) Conductance**

49) A resistor of resistance 'R' is cut into two equal parts of resistance R/2, its resistivity becomes: (SAW 2019 GI)
(a) Half **(b) Remains same**
(c) Double (d) Four times

50) The number of electrons in one coulomb charge are equal to: (SAW 2019 GI)
(a) 1.6×10^{-19} (b) 6.02×10^{-18}
(c) 6.25×10^{20} **(d) 6.25×10^{18}**

ENTRY TEST MCQ'S

1) The heat produced by a current I in the wire of resistance R during time interval t is: (2008)
(a) I^2/Rt **(b) I^2Rt**
(c) $I^2/R/t$ (d) IR^2t

2) A 5 Ohm resistor is indicated by a single ______ μm diameter (2008)
(a) Red **(b) Green**
(c) Blue (d) Brown

3) The algebratic sum of potential changes in closed circuit is zero is kirchhoff's ______ rule. (2008)
(a) First **(b) Second**
(c) Third (d) None of these

4) Which of the following has the highest resistivity? (2008)
(a) Germanium **(b) Silver**
(c) Copper (d) Platinum

5) The equivalent current which pases from a poit at higher potential to a point at a lower potential as if it represented a movement of postive charge is: (2010)
(a) Electronic current (b) Electric current
(c) Magnetic lines **(d) Conventional current**

6) **The substances like germanium and silion have:** **(2010)**

(a) **Negative temperature coefficients**

(b) Positive temperature coefficients

(c) Both A and B

(d) None of these

7) **If the number of turns of a solenoid circular coil is doubled, but the current in the coil and radius of the coil remains same, then what will be the magnetic flux density produced by the coil? (2011)**

(a) Magnetic flux density will be halved

(b) Magnetic flux density increases by different amount at different points

(c) Magnetic flux density remains unchanged

(d) **Magnetic flux density will be doubled**

8) **12-volt battery is applied across 6-ohm resistance to have a steady flow of current. What must be the required potential difference across the same resistance to have a steady current of one ampere?** **(2013)**

(a) 12 V (b) **6 V**

(c) 1 V (d) 3 V

9) **Three resistors each having value 'R' are connected as shown in figure. What is the equivalence resistance between 'X'a nd 'Y'?(2013)**

(a) R (b) 3R

(c) **R/3** (d) R^3

10) **If a resistor having resistance 'R' is cut into three equal parts, then the equivalent of parallel combination is:** **(2015)**

(a) $\frac{6}{R}$ (b) $\frac{3}{R}$

(c) $\frac{R}{9}$ (d) $\frac{R}{3}$

11) **Which combinations of seven identical resistors each of 2Ω gives rise to the resultant of 10/11 Ω?** **(2015)**

(a) 5 Parallel, 2 Series (b) 4 Parallel, 3 Series

(c) 3 Parallel, 4 Series **(d) 2 Parallel, 5 Series**

12) **Resistance between two opposite faces of square thin film of area 1 mm^2 having thickness of 1µm if resistivity of material is 10^{-6} Ω m will be:** **(2016)**

(a) 10[illegible] Ω (b) 10[illegible] Ω

(c) 1 Ω **(d) 10^{-6} Ω**

SECTION II

SHORT QUESTIONS

From Exercise:

1. A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by:

i. increasing the potential difference

ii. decreasing the length and the temperature of the wire

Ans. (i) By increasing potential difference drift velocity also increases.

$$V \propto I \propto V_d$$

This equation shows that by increasing potential difference drift velocity also increases.

(ii) By decreasing length and temperature of wire, the resistance of wire decreases.

Reason:

Since $I = \frac{V}{R}$ $(R \propto L)$ and current increases.

As length is decreasing so current is increasing.

So drift velocity also increases.

Thus in both the cases drift velocity increases.

2. Do bends in a wire affect its electrical resistance? Explain. **(DGK 2018)**

Ans. No, bends in a wire do not affect its electrical resistance.

Reason:

Since $R = \rho \frac{L}{A}$

R depends upon length and area of cross-section of wire and bends neither affect area nor length. Thus bends do not affect the electrical resistance of wire.

3. What are the resistance of the resistors given in the figures A and B? What is the tolerance of each? Explain what is meant by the tolerance.

Ans. **(A)**

First Digit = 1 (For Brown)

2^{nd} Digit = 5 (For Green)

No. of Zeros = 2 (For Red)

Hence R = 15×10^2 = 1500 Ω

Tolerence = ± 5% (For gold)

(B)

First digit = 4 (For yellow)

2^{nd} digit = 9 (For white)

No. of zeros = 3 (Orange)

R = 49×10^3 = 49000 Ω

Tolerence = ± 10% (For silver)

Chapter 14

ELECTROMAGNETISM

From Punjab Boards:-

1) **The S.I unit of magnetic flux is given by:** **(LHR 2015 GII) (BAH 2012)**
(a) NmA^{-1} (b) $NA^{-1}m^{-1}$
(c) Nm^2A^{-1} (d) $Nm^{-1}A$

2) **The brightness spot of CRO screen is controlled by:** **(LHR 2012, 2015 GI) (MUL 2014) (FAS 2015, 2016)**
(a) Anodes (b) Cathodes
(c) Grid (d) Plates

3) **1 tesla is equal to:** **(LHR 2015 GI) (MUL 2015) (DGK 2015, 2017)**
(a) $1NmA^{-1}$ (b) $1Nm^{-1}A^{-1}$
(c) $1Nm^{-1}$ (d) $1Nm^{-2}A^{-1}$

4) $\sum_{r=1}^{N} (B.\Delta L)r = \mu_o I$ **is the relation for:** **(LHR 2012)**
(a) Millikan's law (b) Gauss's law
(c) Ampere's law (d) Lenz's law

5) **If the number of turns become double but length remain same, then magnetic field in the solenoid become:** **(LHR 2015 GII)**
(a) Half (b) Double
(c) Remain same (d) Zero

6) **The brightness of the spot on CRO screen is controlled by:** **(LHR 2016)**
(a) Cathode (b) Anode
(c) Grid (d) Plates

7) **The magnetic force is simply a:** **(LHR 2016)**
(a) Reflecting force (b) Deflecting force
(c) Restoring force (d) Gravitational force

8) **Which one of the following particles moving in the magnetic field cannot be deflected:** **(LHR 2017)**
(a) α-particle (b) β-particle
(c) Electron (d) Neutron

9) **Filament in C.R.O:** **(LHR 2017)**
(a) Controls the number of electrons
(b) Controls the brightness of screen
(c) Has negative potential (d) Emits electrons

10) **A 5m wire carrying in a current of 2A is at right angle to the uniform magnetic field of 0.5 weber/m². The force on the wire is:** **(LHR 2017)**
(a) 2N (b) 4N
(c) 5N (d) 1.5N

11) **The e/m of a neutron is:** **(GUJ 2015)**
(a) Less than electron (b) Greater than electron
(c) Zero (d) The same as electron

12) **Torque on a current carrying coil is given by:** **(GUJ 2015)**
(a) ILB cos α (b) ILB sin α
(c) IBA cos α (d) IBA sin α

13) **Magnetic force on a moving charged particle is perpendicular to the:** **(GUJ 2012)**
(a) Magnetic field (b) Electric field
(c) Velocity of the particle
(d) Magnetic field and velocity of the particle

14) **Force on a charged particle is zero when projected at angle with the magnetic field.** **(MUL 2015 GI)**
(a) 0° (b) 90°
(c) 45° (d) 270°

15) **The field inside a solenoid is given by:** **(MUL 2014 GI)**
(a) $\mu_o nI$ (b) $\mu_o n3I$
(c) $\mu_o nI2$ (d) $\mu_o NI$

16) **The fact that the electric current produces magnetic field was discovered by:** **(MUL 2013)**
(a) Newton (b) Maxwell
(c) Henry (d) Oersted

17) **The unit of magnetic flux is:** **(MUL 2012 Supply, 2015 GI)**
(a) Tesla (b) Weber
(c) Weber m^{-2} (d) Tesla m^2

18) **Two long parallel wires carrying currents in the same direction will:** **(MUL 2013)**
(a) Repel each other (b) Attract each other
(c) Remain at rest (d) Start rotating

19) **Direction of the vector L × B is same as:** **(MUL 2012)**
(a) Force (b) Mag Field
(c) Electric Field (d) Length of the conductor

20) **A charged particle moving in a magnetic field experiences a force in the direction:** **(MUL 2012 Supply)**
(a) Of the field (b) Opposite to the field
(c) Of its motion
(d) Perpendicular to the field and motion

21) **Cathode ray oscilloscope works by deflecting a beam of:** **(MUL 2013)**
(a) Protons (b) Prositrons
(c) Electron (d) Neutrons

22) ________ **is correct relation.** **(MUL 2016)**
(a) $1T = 10^4 G$ (b) $1T = 10^{-4} G$
(c) $1T = 10^{-2} G$ (d) $1T = 10^2 G$

23) An electron enters the magnetic field at right angle from left, $\vec{B}$ is into paper. The electron will be deflected:- (MUL 2016)
(a) Upward (b) Towards right
(c) **Downward** (d) Towards left

24) **Two parallel straight wires carrying current in opposite direction:** (MUL 2017)
(a) **Repel each other** (b) Attract each other
(c) Have no effect upon each other
(d) They cancel our their individual magnetic effect

25) **Magnetic flux density is measured in:** (BAH 2014)
(a) Weber (b) **Weber/m²**
(c) Tesla-m (d) Gauss

26) **The Lorentz Force on a charged particle moving in electric field E and magnetic field B is given by:** (BAH 2014)
(a) **$F = F_E + F_B$** (b) $F = F_E - F_B$
(c) $F = \frac{F_B}{F_E}$ (d) $F = F_E \times F_E$

27) **Unit of magnetic flux is:** (BAH 2015)
(a) **Weber** (b) Gauss
(c) Tesla (d) Ampere m²

28) **Useful device to measure resistance, current and voltage is an electronic instrument called:** (BAH 2016)
(a) Voltmeter (b) Ammeter
(c) Ohmmeter (d) **Digital Multimeter**

29) $\frac{e}{m}$ **of an electron is:** (FAS 2012)
(a) $\frac{B^2r^2}{2V}$ (b) $\frac{Br^2}{2V}$
(c) **$\frac{2V}{B^2r^2}$** (d) $\frac{2v^2}{B^2r^2}$

30) **The charges moving perpendicular to magnetic field experience force:** (FAS 2015, 2016)
(a) **Maximum** (b) Minimum
(c) Zero (d) Infinite

31) **The unit of $\vec{E}$ is NC^{-1} and that of B is $NA^{-1}m^{-1}$ then the unit of $\frac{E}{B}$ is:** (FAS 2014)
(a) ms^{-2} (b) ms
(c) **ms^{-1}** (d) $m^{-1}s^{-1}$

32) **The value of permeability of free space in SI unit is:** (FAS 2014)
(a) $4\pi\times10^{-9}\ wbA^{-1}m^{-1}$ (b) **$4\pi\times10^{-7}\ wbA^{-1}m^{-1}$**
(c) $4\pi\times10^{-10}\ wbA^{-1}m^{-1}$ (d) $4\pi\times10^{7}\ wbA^{-1}m^{-1}$

33) **The value of e/m of neutron is:** (FAS 2013)
(a) 1.75×10^{11} c/kg (b) 1.75×10^{-11} c/kg
(c) 1.6×10^{-19} c/kg (d) **Zero**

34) **In CRO, the wave form of time base generator is:** (FAS 2012)
(a) Circular (b) Square
(c) Sinusoidal (d) **Saw-toothed**

35) **If a charge is at rest in a magnetic field then force on charge is:** (FAS 2016)
(a) **Zero** (b) $q(\vec{V}\times\vec{B})$
(c) $qVB\sin\theta$ (d) $qVB\cos\theta$

36) **One Tesla is equal to** (FAS 2016)
(a) NAm^{-1} (b) $N^{-1}Am^{-1}$
(c) NAm (d) **$NA^{-1}m^{-1}$**

37) **The sum of electric and magnetic force is called:** (FAS 2017)
(a) Maxwell force (b) **Lorentz force**
(c) Netwon's force (d) Centripetal force

38) **Brightness in cathode ray oscilloscope is controlled by:** (RAW 2014)
(a) **Grid** (b) Filament
(c) Anode (d) Cathode

39) **Force on a moving charge in a magnetic field is given by:** (RAW 2017)
(a) $F = q(\vec{B}\times\vec{V})$ (b) **$F = q(V\times B)$**
(c) $F = q(B\cdot V)$ (d) $F = q(B - V)$

40) **Force on a moving charge in a uniform magnetic field will be maximum, when angle between V and B is:** (SAG 2012)
(a) 0° (b) 30°
(c) 60° (d) **90°**

41) **An electron of mass 'm' and charge 'e' is moving in a circle of radius 'r' with speed 'v' in a uniform magnetic field of strength B. Then:** (SAG 2013 GII)
(a) **$r \propto m$** (b) $r \propto B$
(c) $r \propto \frac{1}{v}$ (d) $r \propto \frac{1}{m}$

42) **The magnetic field inside a long solenoid, when current "I" passed through it will be:** (SAG 2012)
(a) Weak (b) **Strong**
(c) Zero (d) Ist strong there

43) **Torque on a current carrying coil has the equation:** (SAG 2013 GI)
(a) $\tau = q(v\times B)$ (b) $\tau = BIL.q$
(c) **$\tau = BINA\ Cos\alpha$** (d) $\tau = NLAB\ Cos\,\alpha$

44) **In current carrying long solenoid the magnetic field produced does not depend upon.** (SAG 2017)
(a) **The radius of solenoid** (b) Number of turns per unit length
(c) Current flowing through solenoid (d) All of above

45) **A current carrying conductor experiences maximum magnetic force in a uniform magnetic field when it is placed** (SAG 2017)
(a) **Perpendicular to field** (b) Parallel to field
(c) At an angle of 60° to the field
(d) At an angle of 180° to the field

46) Magnetic lines of force are (SAG 2017)
(a) Imaginary (b) Real
(c) Perpendicular
(d) In phase with electric lines of force

47) The unit of permeability of free space is: (DGK 2015 GII)
(a) $\frac{Wb}{m^2}$ (b) $\frac{Wbm}{A}$
(c) $\frac{Wb}{Am}$ (d) $\frac{WbA}{m}$

48) The number of electrons in CRO is controlled by: (DGK 2015 GI)
(a) X-deflecting plates (b) Y-deflecting plates
(c) Grid (d) Filament

49) When a charged particle is projected perpendicularly in a magnetic field, its trajectory is: (DGK 2014 GII)
(a) Hyperbola (b) Parabola
(c) Helix (d) Circular

50) The SI unit of magnetic permeability is: (DGK 2012, 2014 GI)
(a) $WbA^{-1}m^{-1}$ (b) Wbm^2
(c) $WbmA^{-1}$ (d) $WbAm^{-1}$

51) In CRO, which component controls the brightness (DGK 2017)
(a) Filament (b) Grid
(c) Anode (d) Deflecting plates

52) Magnetic flux density at a point due to current carrying coil is determined by: (DGK 2017)
(a) Ampere's law (b) Gauss's law
(c) Faraday's law (d) Lenz's law

53) If a charge is free to move in an electric field, then acceleration will be: (SAW 2013)
(a) $\frac{qE}{m}$ (b) qEm
(c) $\frac{q}{Em}$ (d) $\frac{m}{qE}$

54) Work done on a charged particle moving in uniform magnetic field is: (SAW 2014)
(a) Maximum (b) Zero
(c) Minimum (d) Negative

55) One weber is equal to: (DGK 2013)
(a) NmA^{-1} (b) $Nm^{-1}A$
(c) $NA^{-1}m^{-1}$ (d) $NA^{-1}m^{-2}$

56) If F_1 and F_2 are the magnetic force acting on α-particle and electron respectively, when moving perpendicular to the magnetic field then: (LHR 2018)
(a) $F_1 = F_2$ (b) $F_1 > F_2$
(c) $F_1 < F_2$ (d) $F1 = 4F_2$

57) The S.I unit of magnetic induction is: (LHR 2018)
(a) Weber (b) Tesla
(c) Gauss (d) Newton

58) Cathode ray oscilloscope works by deflecting beam of ________. (MUL 2018)
(a) Protons (b) Electrons
(c) Neutrons (d) Positrons

59) Two parallel wires carrying current in the same direction: (MUL 2018)
(a) Have no effect (b) Repeal each other
(c) Have no field around them
(a) Attract each other

60) The vector sum of the electric force and magnetic force is known as: (MUL 2018)
(a) Maximum force (b) Lorentz force
(c) Deflecting force (d) Newton's force

61) The current flowing towards the reader can be represented by a symbol: (MUL 2018)
(a) Dot (b) Dash (c) Cross (d) Line

62) For a current carrying solenoid the term "n" has units as: (BAH 2018)
(a) No unit (b) m^{-1}
(c) m^{-2} (d) m^{-3}

63) One Tesla is equal to: (BAH 2018)
(a) NmA^{-1} (b) $N^{-1}amA$
(c) $NA^{-1}m^{-1}$ (d) NAm

64) If length of Solenoid is doubled but N same, $\vec{B}$ inside the Solenoid becomes: (BAH 2018)
(a) Half (b) Double
(c) One fourth (d) Four times

65) Cathode ray oscilloscope works by deflecting a beam of: (FAS 2018)
(a) Electrons (b) Protons
(c) Neutrons (d) Positrons

66) A current carrying conductor is placed in uniform magnetic filed parallel to it. The magnetic force experienced by the conductor is: (FAS 2018)
(a) F = ILB (b) F = ILB Sinθ
(c) F = ILB cosθ (d) F is zero

67) If current flowing through a solenoid becomes four times, then magnetic field inside it becomes: (RAW 2018)
(a) Two time (b) Three times
(c) Four times (d) Half

68) Two current carrying parallel conductors are lying in same direction, they: (RAW 2018)
(a) form magnetic dipole
(b) Attract each other
(c) Repel each other (d) Have no effect

69) Two parallel wires carrying currents in opposite direction: (SAG 2018)
(a) Repel each other
(b) Attract each other
(c) Neither attract nor repel each other
(d) Stick to each other

70) Magnetic flux is minimum, when angle between vector area and $\vec{B}$ is: (SAG 2018)
(a) 90° (b) 45°
(c) 0° (d) 180°

71) The fore on current carrying conductor placed in magnetic field is expressed by: (SAG 2018)
(a) $\vec{F} = I\vec{L}\cdot\vec{B}$ (b) $\vec{F} = I\vec{L}\times\vec{B}$
(c) $\vec{F} = I^2\vec{L}\times\vec{B}$ (d) $\vec{F} = I\vec{B}\times\vec{L}$

72) The magnetic force on an electron, travelling at 106 m/s parallel to the field of strength 1 Weber /m² is: (DGK 2018)
(a) 10^{-12} N (b) Zero
(c) 10^3 N (d) 16×10^{-12} N

73) Two parallel wires carrying current in the same direction: (DGK 2018)
(a) Repel each other
(b) Have no effect upon each other
(c) Attract each other
(d) Cancel each other effect

74) A charge particle having charge q is moving at right angle to magnetic field. The quantity which varies is: (SAH 2018)
(a) speed (b) kinetic energy
(c) path of motion (d) Angular velocity

75) A positive charge is moving towards an observer. The direction of magnetic induction will be: (SAH 2018)
(a) towards right (b) clock wise
(c) anti clock wise (d) towards left

76) The magnetic force is simply a: (LHR 2019 GI)
(a) Reflecting force (b) Restoring force
(c) Deflecting force (d) Gravitational force

77) The unit of $\vec{E}$ is NC^{-1} and that of $\vec{B}$ is $NA^{-1}\ m^{-1}$ then the unit of $\frac{\vec{E}}{\vec{B}}$ is: (LHR 2019 GI)
(a) ms^{-2} (b) $m^{-1}s^{-1}$
(c) ms (d) ms^{-1}

78) By mass spectrograph we can find the value of mass by using formula: (LHR 2019 GI)
(a) $m = \left(\frac{e^2r^2}{2V}\right)B^2$ (b) $m = \left(\frac{er^2}{2V}\right)B^2$
(c) $m = \left(\frac{eV}{2r^2}\right)B$ (d) $m = \left(\frac{eV^2}{2r}\right)B$

79) The value of $\frac{e}{m}$ is smallest for: (LHR 2019 GI)
(a) Proton (b) Electron
(c) β-particle (d) Positron

80) When a charged particle is projected opposite to the direction of magnetic field, it experiences a force equal to: (RAW 2019 GI)
(a) quB cos θ (b) quB sin 90
(c) quB (d) Zero

81) An electron travelling at 10^6 m/s enters parallel in a magnetic field of 1 tesla, the magnetic force acting on it is: (RAW 2019 GI)
(a) Zero (b) 10^{-12} N
(c) 10^3 N (d) 1.6×10^{-13} N

82) The value of permeability of free space 'μ_o' is: (MUL 2019 GI)
(a) $4\pi\times10^{-7}$ Wb $A^{-1}m^{-1}$
(b) $4\pi\times10^{7}$ Wb $A^{-1}m^{-1}$
(c) $4\pi\times10^{-7}$ Wb Am^{-1}
(d) $4\pi\times10^{7}$ Wb Am^{-1}

83) Formula for magnetic field due to solenoid is given by: (MUL 2019 GI)
(a) $\mu_o I$ (b) $\mu_o nI$
(c) μ_o SI (d) $\mu_o n\ell$

84) Two parallel wires carrying current in opposite direction: (SAG 2019 GI)
(a) Repel each other (b) Attract each other
(c) Neither attract nor repel
(d) Stick to each other

85) A 5m wire carrying current 2 A at right angle to uniform magnetic field of 0.5 T. The force on the wire is: (SAG 2019 GI)
(a) 1.5 N (b) 5 N
(c) 2.5 N (d) 4 N

86) The brightness of spot on CRO screen is controlled by: (DGK 2019 GI)
(a) Anode (b) Cathode
(c) Grid (d) Plates

87) If a charge at rest in a magnetic field then force on charges is: (DGK 2019 GI)
(a) Zero (b) Maximum
(c) $q\bar{V}\times\bar{B})$ (d) qVB cosθ

88) The SI unit of flux density is: (DGK 2019 GI)
(a) Gauss (b) Tesla
(c) Weber / meter (d) Weber

89) The brightness of spot in CRO is controlled by: (SAW 2019 GI)
(a) Cathode (b) Anode
(c) Grid (d) Deflecting plates

90) Magnetic field of 0.5 T is parallel to vector area of 1m² of a coil, flux through the coil is: (SAW 2019 GI)
(a) Zero (b) 5 web
(c) 0.2 web (d) 0.5 web

ENTRY TEST MCQ'S

1) The value of permeability of free space μ_o is: (2008)

(a) $4\pi \times 10^{-7}\ WbA^{-1}m^{-1}$ (b) $4\pi \times 10^{2}\ WbA^{-2}m^{-2}$
(c) $4\pi \times 10^{-7}\ WbA^{-2}m^{-1}$ (d) $4\pi \times 10^{2}\ WbA^{-1}m^{-2}$

2) The current measuring part of the Avometer consists of number of low resistances connected: (2009)

(a) At an angle of 180° with the galvanometer
(b) Parallel with the galvanometer
(c) At an angle of 45° with the galvanometer
(d) Perpendicular to the galvanometer

3) What shunt resistance must be connected across a Galvanometer of 20 Ω resistance which gives full scale deflection with 2.0 A current, so as to convert it into an Ammeter of range 10 A? (2009)

(a) 5 Ω (b) 2 Ω
(c) 3 Ω (d) 4 Ω

4) A charge of two micro columbos (2μC) moves with velocity of two meter per second (2 m/sec) in the direction of two Tesla magnetic field. The force that will act on it will be: (2009)

(a) 2 N (b) Zero
(c) 8 N (d) 4 N

5) Which one of the following relations is correct? (2010)

(a) $1\ wb\ m^{-2} = N\ m^{-1}\ A^{-1}$
(b) 1 Tesla = 10^4 Gausses
(c) $1\ wb\ m^{-2}$ = 1 Tesla **(d) All of these**

6) The grid in the cathode ray oscillosocope ________. (2010)

(a) Controls number of waves
(b) Controls the brightness of spot formed
(c) Accelerates electrons
(d) Has positive potential will respect to cathode

7) The torque acting on a current carrying coil is given by ________. (2010)

(a) T = NIAB cos α (b) T = BIL sin α
(c) T = NIAB is α (d) T = BIL cos α

8) Force on a current carrying conductor in a uniform magnetic field is: (2010)

(a) F = NIA cos α (b) F = μnI
(c) F = ILB sin α (d) F = ILA cos α

9) Electron gun in cathode ray oscilloscope contains: (2011)

(a) Filament, cathode, grid, anodes
(b) Cathode, anode, capacitor, screen
(c) Emitter, base, collector
(d) Resistance, capacitor, inductor

10) The voltage that is applied across X-plates is provided by a circuit called: (2012)

(a) Audio generator **(b) Time base generator**
(c) Singal generator (d) Linear generator

11) A 10 cm long solenoid has 100 turns. What will be the magnetic field inside it along its axis if one micro ampere current is passed through it? (2012)

(a) $4\pi \times 10^{-13}$ tesla (b) $4\pi \times 10^{-7}$ tesla
(c) $4\pi \times 10^{-14}$ tesla (d) $4\pi \times 10^{-16}$ tesla

12) A solenoid is cut into two halves. Magnetic induction due to same current in each half will be: (2013)

(a) Half of the original (b) Double of the original
(c) Same as original (d) Four times of the original

13) A long straight current caryying conductor has current directed from bottom to top when held vertically. What will be the direction of magnetic field lines when observed from below the conductor. (2013)

(a) Clockwise (b) Anti clockwise
(c) Vertically upward (d) Vertically downward

14) Due to current in a straight conductor the difference between magnetic field lines: (2014)

(a) Increases away from conductor
(b) Decreases away from conductor
(c) Increases towards conductor
(d) Decreases and then increases towards conductor

15) Magnetic field strength is measure in: (2015)

(a) Wbm^{-1} **(b) Wbm^{-2}**
(c) Wbm^{-2} (d) Wb

16) Force on current carrying conductor per unit length is given by: (2015)

(a) IL sinθ (b) ILB
(c) IL **(d) IB sinθ**

17) The force acting on current carrying conductor will be maximum if the angle between magnetic field and conductor is: (2016)

(a) 0° (b) 30°
(c) 90° (d) 60°

Chapter 15

ELECTROMAGNETIC INDUCTION

From Punjab Boards:

1) **One henry is equal to:** (LHR 2012)
   (a) $VS A^{-1}$ (b) $N.mA^{-1}$
   (c) $V^{-1}.S.A$ (d) $N_S.N_P = 1$

2) **The mutual induction plays role in:** (LHR 2015 GI)
   (a) Generator (b) Galvanometer
   (c) **Transformer** (d) D.C. motor

3) **An inductor may store energy in:** (LHR 2016)
   (a) **Its magnetic field** (b) Its electric field
   (c) Its coil (d) A neighbouring circuit

4) **The S.I unit of self inductance or mutual inductance is:** (LHR 2017)
   (a) Maxwell (b) Weber
   (c) **Henry** (d) Tesla

5) **Energy stored per unit volume in magnetic field is called:** (LHR 2017)
   (a) Electric flux (b) **Energy density**
   (c) Work (d) Power

6) **Lenz's law is in accordance with the law of conservation of:** (LHR 2017) (MUL 2016)
   (a) Momentum (b) Angular momentum
   (c) Charge (d) **Energy**

7) **Which one is not present in A.C generator?** (GUJ 2015)
   (a) Armature (b) Magnet
   (c) Slip rings (d) **Commutator**

8) **The self induction is given by:** (GUJ 2015)
   (a) $NL = \phi I$ (b) $NI = L\phi$
   (c) $N\phi = LI$ (d) $N = LI$

9) **The Lenz's law fulfils:** (MUL 2015 GI)
   (a) **Law of Conservation of energy**
   (b) Law of Conservation of Charge
   (c) Law of Conservation of Momentum
   (d) Kirchhoff's Law

10) **Lenz's law is a consequence of the law of conservation of:** (MUL 2014 GI)
   (a) Charge (b) Current
   (c) **Energy** (d) Momentum

11) **Mutual induction between two coils depends upon their:** (MUL 2012 Supply)
   (a) Size (b) Shape
   (c) Separation
   (d) **...ape, seperation and orientation**

12) The application of mutual induction is a: (MUL 2015 GI)

(a) D.C motor (b) Radio
(c) Television **(d) Transformer**

13) Magnitude of the motional emf induced in a conducting bar of length L moving through a magnetic field B with velocity V is: (MUL 2012 Supply)

(a) $\varepsilon = BvL$ (b) $\varepsilon = BvL \cos\theta$
(c) $\varepsilon = BvL \sin\theta$ (d) $0 = Bv \cdot L$

14) In case of inductor, energy is stored inthe: (MUL 2015 GII)

(a) Electric field **(b) Magnetic field**
(c) Potential field (d) Gravitational field

15) In A.C wave form, negative peak value is obtained at the phase angle of: (MUL 2016)

(a) 90° (b) 120°
(c) 270° (d) 360°

16) The self inductance of solenoid is:- (MUL 2016)

(a) $L = \mu_o n A\ell$ (b) $L = \mu_o N^2 A\ell$
(c) $L = \mu_o n^2 A\ell$ (d) $L = \mu_o n A\ell$

17) The output voltage of an A.C generator at time $t = \frac{T}{4}$ is given by: (MUL 2017)

(a) $V = -V_o$ **(b) $V = V_o$**
(c) $V = 0$ (d) $V = \frac{V_o}{4}$

18) ---------- expressions for mutual inductance is correct: (MUL 2017)

(a) $M = \frac{N_s \phi_s}{I_P}$ (b) $M = \frac{\phi_s}{N_s I_P}$
(c) $M = \frac{I_P}{N_s I_s}$ (d) $M = \frac{N_s}{I_P f_s}$

19) --------- is not present in A.C generator (MUL 2017)

(a) Armature (b) Magnet
(c) Slip-rings **(d) Commutator**

20) If an inductor has N turns of a coil and ϕ is magnetic flux through its each turn when current I is flowing in it, then its self inductance is given by L: (BAH 2012)

(a) $\frac{I}{N\phi}$ **(b) $\frac{N\phi}{I}$**
(c) $\frac{NI}{\phi}$ (d) $\frac{\phi}{NI}$

21) The negative sign with induced emf in Faraday's Law is in accordance with: (BAH 2014)

(a) Lenz's Law (b) Ampere's Law
(c) Gauss's Law (d) Boyle's Law

22) The maximum value of emf induced in armature of N turns and area A rotating in magnetic field B with frequency "f" is given by: (BAH 2012)

(a) $2\pi f NAB$ (b) $2\pi f N^2 AB$
(c) $Nf AB$ (d) $4\pi f^2 NAB$

23) $\frac{B^2}{2\mu_o}$ is the expression of: (BAH 2015)

(a) Lenz's Law (b) Magnetic energy
(c) Magnetic energy density
(d) Back emf

24) Mutual Induction has a practical role in the performance of the: (BAH 2016)

(a) Radio Choke **(b) Transformer**
(c) A.C. Generator (d) D.C. Generator

25) If the speed of rotation of a generator is doubled the output voltage will be: (BAH 2016)

(a) Remain same **(b) Double**
(c) Four Time (d) One Half

26) Energy stored per unit volume in the inductor is: (2013)

(a) $\frac{1}{2}LI^2$ (b) $\frac{B^2}{2\mu_o}$
(c) $\frac{B^2}{4\mu_o}$ (d) $\frac{1}{2}L^2I$

27) An electric generator is based on the principle of: (FAS 2013)

(a) Faraday's law (b) Lenz's law
(c) Amper law (d) Gauss's law

28) Lenz's law deals with: (FAS 2015, 2016)

(a) Magnitude of emf (b) Direction of emf
(c) Direction of induced current
(d) Resistance

29) Which one is not present in AC generator? (FAS 2015)

(a) Carbon brush (b) Coil
(c) Magnetic field **(d) Split ring**

30) The energy density of an inductor is: (FAS 2012)

(a) $\frac{B^2}{2\pi_0^2}$ (b) $\frac{\mu_0}{2B}$
(c) $\frac{\mu_0}{2B^2}$ **(d) $\frac{B^2}{2\mu_0}$**

31) The energy stored in an inductor is given as: (FAS 2016)

(a) LI^2 (b) $\frac{1}{2}LI^2$

(c) $\frac{1}{2}L^2I$ (d) L^2I

32) emf is induced due to change in: (FAS 2016)

(a) Charge (b) Current

(c) Magnetic flux (d) Electric field

33) Which one is not present in AC generator? (FAS 2016)

(a) Carbon brush (b) Coil

(c) Magnetic field **(d) Split ring**

34) A metal rod of 1m is moving at a speed of $1ms^{-1}$ in a direction making an angle 30° with 0.5T magnetic field. The emf produced is: (FAS 2017)

(a) 0.25N (b) 2.5N

(c) 0.25V (d) 2.5V

35) The Lenz's law is in accordance with law of conservation of: (RAW 2014) (DGK 2015) (SAW 2016)

(a) Mass **(b) Energy**

(c) Charge (d) Momentum

36) Energy density in an inductor is: (RAW 2016)

(a) Directly proportional to magnetic field

(b) Directly proportional to square of magnetic field

(c) Inversely proportional to magnetic field

(d) Inversely proportional to square of magnetic field

37) One Henry is: (RAW 2017)

(a) VsA (b) VsA^2

(c) VsA^{-1} (d) V^2sA^{-1}

38) If the coil is wound on an iron core, the magnetic flux through it will: (RAW 2017)

(a) Zero **(b) Increases**

(c) Decreases (d) Remain constant

39) A generator converts mechanical energy into: (SAG 2013 GI)

(a) Chemical energy (b) Light energy

(c) Heat energy **(d) Electrical energy**

40) The phase difference between each pair of coils of a three phase A.C generator: (SAG 2012)

(a) 0° (b) 90°

(c) 120° (d) 180°

41) The energy stored per unit volume is side a solenoid is calculated by: (SAG 2012)

(a) $\frac{1}{2}\frac{B^2}{\mu_o}$ (b) $\frac{1}{\mu_o}\frac{B^2}{}$

(c) $\frac{1}{2}\frac{\mu_o}{B^2}$ (d) $\frac{1}{2}\frac{\mu_o}{B^2}$

42) A rod of length 20 m is moving with 20m/s in a direction perpendicular to magnetic field of 20 T what is the value of emf. (SAG 2013 GI)

(a) 20000 V (b) 4000 V

(c) 6000 V **(d) 8000 V**

43) The S.I units of induced emf is: (SAG 2012)

(a) Ohm (b) Tesla

(c) Henery **(d) Volt**

44) 1 henery = 1 ...... (SAG 2013 GII)

(a) VAs^{-1} **(b) VsA^{-1}**

(c) VmA^{-1} (d) VAm^{-1}

45) Induced emf of a.c. generator is (SAG 2017)

(a) VBL sinθ (b) IBL sinθ

(c) NWAB sinθ (d) NIAB cos a

46) The motional emf depends upon the (SAG 2017)

(a) Length of conductor (b) Speed of conductor

(c) Strength of magnet **(d) All of these**

47) When a conductor moves across a magnetic field, an emf is set up, this emf is called (SAG 2017)

(a) Variable emf (b) Constant emf

(c) Back emf **(d) Induced emf**

48) If we make magnetic field stronger the value of induced current is: (DGK 2014 GI)

(a) Decreased **(b) Increase**

(c) Vanishes (d) Remains constant

49) The energy stored in the inductor per unit volume is: (DGK 2014 GI)

(a) $\frac{B^2}{2\mu o^2}$ (b) $\frac{\mu o}{2B}$

(c) $\frac{\mu o}{2B^2}$ **(d) $\frac{B^2}{2\mu o}$**

50) The equation for energy density is given as: (DGK 2015 GI)

(a) $\frac{1}{2}B^2/\mu o$ (b) B^2/uo

(c) $2B^2/uo$ (d) $\frac{1}{2}B/uo^2$

51) The mutual induction between two coils depends upon: (DGK 2014 GII)

(a) Area of coils

(b) Number of turns of the coils

(c) Distance between the coils

(d) All of these

52) SI unit of mutual inductance is: (DGK 2012 GII)

(a) ASV^{-1} (b) $AS^{-1}V$

(c) $AV^{-1}S^{-1}$ **(d) VSA^{-1}**

53) The principle of alternating current generator is based on: (DGK 2014 GII)

(a) Coulomb's law (b) Ampere's law

(c) Lenz's law **(d) Faraday's law**

54) The relation $\varepsilon = -N\frac{\Delta\phi}{\Delta t}$ is known as: (DGK 2012 GI)

(a) Ampere's law (b) Faraday's law
(c) Lenz's law (d) Kirchoff's law

55) When current flows through the armature coil then the torque produced depend upon: (DGK 2012 GII)

(a) Rotation of the coil (b) Area of the coil
(c) Mutual induction (d) All of these

56) If 10A current passes through 100 mH inductor, then energy stored is: (DGK 2017)

(a) 100J (b) 5J
(c) 20J (d) Zero

57) I henry may be written as: (DGK 2017)

(a) Weber (b) VsA^{-1}
(c) $Vs^{-1}A^{-1}$ (d) $VsA^{-1}T^{-1}$

58) The product of induced current and resistance of the wire through which the current is passing is called: (SAW 2014)

(a) Mutual induction (b) Self induction
(c) Induced current (d) Induced emf

59) In equation $\varepsilon = -VBL \sin\theta$ then θ is the angle between (SAW 2013)

(a) I and B (b) V and B
(c) V and L (d) L and B

60) Energy stored per unit volume is called: (SAW 2013)

(a) Power density (b) Surface charge density
(c) Energy density (d) Induction energy

61) The SI unit of magnetic induction is: (SAW 2016)

(a) Weber (b) Tesla
(c) Newton (d) Weber per meter

62) The motional emf is given by: (SAW 2016)

(a) qvB (b) iBL
(c) eBL (d) Vbl

63) Lenz's law deals with: (LHR 2018)

(a) Induced emf (b) Induced current
(c) Power (d) Electrical energy

64) Henry is S.I unit of: (LHR 2018)

(a) Current (b) Resistance
(c) Flux (d) Self induction

65) A 50 mH coil carries a current of 2.0 A. Then energy stored in its magnetic field is: (MUL 2018)

(a) 0.1 J (b) 10 J
(c) 100 J (d) 1000 J

66) The mutual inductance of the coils depends upon: (MUL 2018)

(a) Density of coil (b) Material of coil
(c) Geometry of coil (d) Stiffness of coil

67) The expression of energy density of solenoid is given as: (MUL 2018)

(a) $\frac{B^2}{\mu_o}$ (b) $\frac{1}{2}\frac{B^2}{\mu_o}$
(c) $\frac{1}{2}\frac{B^2}{\mu_o}$ (d) $B^2\mu_o$

68) A 50 mH coil carries a current of 2 Amp. The energy stored in its magnetic field is: (BAH 2018)

(a) 0.05 J (b) 0.1 J
(c) 10 J (d) 50 J

69) One Henry is equal to: (BAH 2018)

(a) $VS^{-1}A$ (b) VSA^{-1}
(c) $V^{-1}SA$ (d) $VS^{-1}A$

70) The practical illustration of the phenomenon of mutual induction is in the device of: (BAH 2018)

(a) Transformer (b) A.C. Generator
(c) D.C. Generator (d) Ammeter

71) In A.C generator when plane of coil is perpendicular to the magnetic filed, then output of generator is: (RAW 2018)

(a) NWAB (b) $2\pi f$
(c) Maximum (d) Zero

72) Magnetic effect of current is used in: (RAW 2018)

(a) Toaster (b) Electric motor
(c) Electric iron (d) D.C battery

73) Which one is the correct relation for energy density of an inductor? (SAG 2018)

(a) $N\phi = LI$ (b) $U_m = \frac{1}{2}LI^2$
(c) $\varepsilon = -L\frac{\Delta I}{\Delta t}$ (d) $U_m = \frac{B^2}{2\mu_o}$

74) Induced emf can be increased by: (SAG 2018)

(a) Increasing resistance of the coil
(b) Decreasing resistance of the coil
(c) Increasing number of turns of coil
(d) Decreasing rate of magnetic flux

75) Lenz's law is in accordance with the law of conservation of:

(a) Momentum (b) Angular momentum
(c) Charge (d) Energy

76) Which of the following converts electrical energy into mechanical energy? (SAG 2018)

(a) Transformer (b) Motor
(c) D.C. generator (d) A.C. generator

77) Lens's law deals with the: (DGK 2018)

(a) Magnitude of induced current
(b) Direction of induced current
(c) Direction of induced emf
(d) Magnitude of induced emf

78) **Maximum emf generated in a generator is:** **(LHR 2019 GI)**
(a) $\varepsilon = \varepsilon \sin\theta$
(b) $\varepsilon = \varepsilon_o \sin\theta$
(c) $\varepsilon_o = N\varepsilon AB \sin\theta$
(d) $\varepsilon_o = N\omega AB$

79) **Henry is equal to =** **(LHR 2019 GI)**
(a) VSA^{-1}
(b) $VS^{-1}A$
(c) $V^{-1}S^{-1}A$
(d) $V^{-1}S^{-1}A^{-1}$

80) **For an ideal step up transformer: (RAW 2019 GI)**
(a) $N_p > N_s$
(b) $V_sI_s > V_pI_p$
(c) $V_s < V_p$
(d) $I_s < I_p$

81) **Electric current produces magnetic field was discovered by:** **(MUL 2019 GI)**
(a) Faraday
(b) Maxwell
(c) Oersted
(d) Lenz

82) **The Lenz's Law is also a statement of:** **(MUL 2019 GI)**
(a) Law of Conservation of Momentum
(b) Law of Conservation of Charge
(c) Law of Conservation of Energy
(d) Faraday Law of Electromagnetic Induction

83) **If the coil is wound on iron core, the flux through it:** **(SAG 2019 GI)**
(a) Decreases
(b) Becomes zero
(c) Remains constant
(d) Increases

84) **Energy stored per unit volume in magnetic field is called:** **(SAG 2019 GI)**
(a) Energy density
(b) Electric flux
(c) Work
(d) Power

85) **Henry is S.I unit of:** **(DGK 2019 GI)**
(a) Current
(b) Resistance
(c) Flux
(d) Self inductance

86) **Energy stored in the inductor is in the form of:** **(SAW 2019 GI)**
(a) Electric energy
(b) Magnetic energy
(c) Kinetic energy
(d) Chemical energy

87) **The principle of an electric generator based upon:** **(SAW 2019 GI)**
(a) Ampere's law
(b) Faraday law
(c) Coulomb's law
(d) Kirchhoff's law

ENTRY TEST MCQ'S

1) **The Lenz's law refers to induced_______.** **(2008)**
(a) emf
(b) Resistance
(c) Shear
(d) Current.

2) **Two cylinders of equal mass are made from same material. The one with the larger diameter accelerate __________ the other under the action of same torque.** **(2008)**
(a) Faster than
(b) Slower than
(c) Equal to
(d) None of these

3) **In a step-down transformer the ouput current __________.** **(2008)**
(a) Is reduced.
(b) Is increased
(c) Remains same
(d) None of these

4) **Force experienced by a moving charge in a magnetic field is:** **(2009)**
(a) $F = BA\cos\theta$
(b) $F = \mu_o NI$
(c) $F = q(v \times B)$
(d) $F = I(L \times B)$

5) **We have two coils placed close to each other. When the switch on the battery connected to primary coil while keeping the sliding contact of rheostat at fixed position, the reading of Galvanometer.(2009)**
(a) First increases and then becomes zero
(b) First increases and then becomes constant at some value
(c) Increases with the passage of time
(d) Remains zero

6) **Power losses in a transformer can be minimized:** **(2009)**
(a) By increasing turn ratio
(b) By decreasing turn ratio
(c) By stopping the flow of Eddy currents
(d) Using material of the core whose hysteresis area is large

7) **A force 'F' is acting at point 'P' of a uniform rod capable to rotate about 'O'. What is the torque about 'O'?** **(2012)**
(a) (OP)(F tanθ)
(b) (OP)(F)
(c) (OP)(F sinθ)
(d) (OP)(F cos)

8) **Which of the following is the proper way to study the sinusoidal wave form of voltage?** **(2013)**
(a) Voltage is connected to 'Y' input and time base is switched on.
(b) Voltage is connected to 'X' input and time base is switched off.
(c) Voltage is connected to 'Y' input and time base is switched off.
(d) Voltage is connected to 'X' input and time base is switched on.

9) **The resistance of a piece of wire is 12 Ω. It is bent to form an equilateral triangle. What is the equivalent resistance between any two corners of the triangles?** **(2015)**
(a) 1.3Ω
(b) 2.0Ω
(c) 4.0Ω
(d) 2.7Ω

10) **If 'A' is fundamental dimension of ampere then the dimension of magnetic field strength is:** **(2015)**
(a) $[MT^{-2}A^{-2}]$
(b) $[MT^{-2}A^{-1}]$
(c) $[MT^{-2}L^{-2}A^{-1}]$
(d) $[MT^{-2}L^{-2}A^{-2}]$

11) **If we doubled all the parameters of the force acting on current carrying conductor and θ = 90° then magnetic force becomes:** **(2016)**
(a) Half
(b) Double
(c) Eight-times
(d) Four-times

16. Define motional emf. and derive a relation for it.

(RAW 2013)

17. State and explain Faraday's law in detail.

(RAW 2017)

18. A coil of 10 turns and 35cm² area is in a perpendicular magnetic field of 0.5T. The coil is pulled out of the field in 1.0s. Find the induced emf in the coil as it is pulled out of the field.

(RAW 2017) (SAH 2018)

19. Define Motional EMF. Derive a relation for Motional EMF? (SAG 2017)

20. A coil of wire has 10 loops. Each loop has an area of 1.5×10^{-3} m². A magnetic field is perpendicular to the surface of each loop at all times. If the magnetic field is changed from 0.5T to 0.6T in 0.1S find the average emf induced in the coil during this time.

(DGK 2014 G-I)

21. Why is energy stored in an inductor when a current flows in it? Derive relation for energy density of magnetic field.

(MUL 2019 G-I) (DGK 2013 G-II, 2019 G-I)

22. A loop of a wire is placed in a uniform magnetic field that is perpendicular to plane of a loop. The strength of magnetic field is 0.6T. The area of loop begins to shrink at a constant rate of $\Delta A/\Delta t = 0.8\text{m}^2\text{s}^{-1}$. What is the magnitude of emf induce in the loop while it is shrinking. (DGK 2017)

23. The current in a coil of 1000 turns is changed from 5A to zero is 0.2S. If an average emf of 50V is induced during this interval, what is self inductance of the coil. (SAW 2013)

24. Define mutual induction and show that emf induced in the secondary is directly proportional to the time rate of change of current in the primary.

(RAW 2018) (SAW 2014)

25. What do you mean by A.C generator. What is its working principle. Write down its construction. Also derive the relation for voltage and current produced by it. (BAH 2018)

26. Define Lenz's law. On its basis, prove the law of conservation of energy in case of movement of bar magnet towards the coil. (SAH 2018)

27. A circular coil has 15 turns of radius 2cm. The plane of coil lies at 40° to a uniform magnetic field of 0.2T. If the field is increased by 0.5T in o.2 Sec. Find the magnitude of induced emf. (LHR 2019)

Chapter 16

ALTERNATING CURRENT

From Punjab Boards:-

1) **In a pure inductive A.C circuit the current:**

(LHR 2015 GII)

- **(a) Lags behind voltage by 90°**
- (b) Leads the voltage by 90°
- (c) In phase with voltage
- (d) Leads the voltage by 270°

2) **The frequency of A.C. source used in Pakistan is:** (LHR 2015 GII)

- **(a) 50 Hz**
- (b) 60 Hz
- (c) 45 Hz
- (d) 70 Hz

3) **Power dissipation in a pure inductive or in a pure capacitance circuit is:** (LHR 2012)

- (a) Infinite
- **(b) Zero**
- (c) Minimum
- (d) Maximum

4) **The phase angle between the voltage and current through resistor is:** (LHR 2016)

- **(a) 0°**
- (b) 45°
- (c) 180°
- (d) 270°

5) **When 10V are applied to an A.C. circuit, the current flowing in it is 100 mA, its impedance is:** (LHR 2017)

- (a) 50 Ω
- (b) 75 Ω
- **(c) 100 Ω**
- (d) 90 Ω

6) **Power dissipated in pure inductor over a complete a.c. cycle is:** (LHR 2017) (SAG 2016, 2017)

- (a) Large
- (b) Small
- (c) Infinite
- **(d) Zero**

7) **At resonance frequency the impedance of RLC series circuit is:** (LHR 2017)

- (a) Zero
- **(b) Minimum**
- (c) Maximum
- (d) Moderate

8) **The value of peak to peak voltage is:** (LHR 2017)

- (a) V_o
- (b) $-V_o$
- (c) $\sqrt{2}V_o$
- **(d) $2V_o$**

9) **If I_0 is the peak value of AC supply, then its rms value is given as I_{rms} = ________** (GUJ 2012)

- **(a) $\frac{I_0}{\sqrt{2}}$**
- (b) $\frac{I_0}{0.707}$
- (c) $\sqrt{2I_0}$
- (d) $\frac{7N}{8}$

10) **The peak value of A.C source is 20A, then its rms value will be** (GUJ 2015)

- **(a) 14.1 A**
- (b) 10 A
- (c) 20 A
- (d) 28.2 A

11) Resonating frequency of RLC series circuit of fr=________ (GUJ 2012)

(a) $\frac{2\pi}{\sqrt{LC}}$ (b) $\frac{1}{2p}\sqrt{LC}$

(c) $\frac{1}{2\pi\sqrt{LC}}$ (d) $2p\sqrt{LC}$

12) Direct current cannot flow through (GUJ 2015)

(a) Indicator (b) resistor

(c) transistor (d) capacitor

13) If I_{rms} = 10A then I_o will be equal to: (MUL 2013)

(a) 14.2A (b) 1.42A

(c) 142A (d) 0.142A

14) Main reason for worldwide use of A.C is: (MUL 2015 GII)

(a) It is cheaper

(b) Transmitted to long distance

(c) Both A & B (d) Reaches in short time

15) The combined effect of resistance and reactance is known as: (MUL 2015 GII)

(a) Inductance (b) Conductance

(c) Resistance (d) Impedance

16) In pure resistive AC circuit the instantaneous values of current and voltage are: (MUL 2013)

(a) In phase

(b) Perpendicular to each other

(c) Out of phase

(d) May or may not be in phase

17) The waveform of alternating voltage is: (MUL 2015 GI)

(a) Cotangent Curve (b) Cosine Curve

(c) Tangent Curve (d) Sine Curve

18) Three phase A.C supply machine has: (MUL 2012)

(a) No terminal (b) Two terminal

(c) Four terminal (d) six terminals

19) Inductance of the coil can be increased by using: (MUL 2012)

(a) Paramagnetic core (b) Diamagnetic core

(c) Ferromagnetic core (d) Antiferromagnetic core

20) The peak value of an alternative current is $I_o \times I_o$. Its mean square value is: (MUL 2012 Supply)

(a) O (b) 2Io

(c) $\sqrt{I_o^2/2}$ (d) I_o^2

21) The basic circuit element/elements in a D.C circuit is: (MUL 2014 GI)

(a) Resistor (b) Inductor

(c) Capacitor (d) Transistor

22) Phase difference between V and I of an A.C through resistor is: (MUL 2015 GI)

(a) Zero degree (b) 90°

(c) 180° (d) 270°

23) At higher frequencies, which of the following plays a dominant role in RLC series circuit: (MUL 2015 GII)

(a) Resistor (b) Inductor

(c) Capacitor (d) Transistor

24) In R-L-C circuit, the energy is dissipated in: (MUL 2016)

(a) R only (b) R and L

(c) R and C (d) R, L and C

25) At resonance frequency, the impedance of RLC – Parallel Circuit is:- (MUL 2016)

(a) Zero (b) Infinite

(c) Minimum (d) Maximum

26) In three phase A.C generator, phase difference between each pair of coil is: (MUL 2017)

(a) 90° (b) 270°

(c) 120° (d) 180°

27) The expression P = VI holds only when current and voltage are: (MUL 2017)

(a) In phase (b) Out of phase

(c) At right angle to each other

(d) At angle of 120°

28) In an A.C circuit with resistor only the current and voltage have a phase of angle of: (BAH 2014)

(a) 180° (b) 90°

(c) 0° (d) 60°

29) The power dissipated in A.C circuits is given by $P = I_{rms} V_{rms} \cos\theta$ in this relation $\cos\theta$ is called: (BAH 2012)

(a) Phase factor (b) Gain factor

(c) Loss factor (d) Power factor

30) In three phase voltage across any two lines is about: (BAH 2015)

(a) 220V (b) 230V

(c) 400V (d) 430V

31) A.C. through inductor, the applied voltage: (BAH 2016)

(a) Leads the current by $\frac{\pi}{2}$

(b) Lags the current by $\frac{\pi}{2}$

(c) And Current are in phase

(d) And Current are out of phase 180°

32) The slope of q – t curve at any instant of time gives: (BAH 2016)

(a) Current (b) Voltage

(c) Charge (d) Both A and B

33) In three phase AC generator the phase difference between each pair of coil is: (FAS 2015)

(a) 45° (b) 60°

(c) 90° (d) 120°

34) The power dissipation in AC circuit is expressed as: (FAS 2015)

(a) $P = I_{rms} \times V_{rms} \cos\theta$ (b) $P = I \times V \cos 2\theta$

(c) $P = I_{rms} \times V_{rms} \sin\theta$ (d) [illegible]

35) In R-L-C series circuit, the current at resonance frequency is: (FAS 2013)
(a) Minimum (b) Zero
(c) Maximum (d) Infinite

36) At resonance frequency, the impedance of RLC series circuit is: (FAS 2015)
(a) Maximum (b) Minimum
(c) Zero (d) Infinite

37) SI unit of impedance is: (FAS 2013)
(a) Henry (b) Hertz
(c) Ampere (d) Ohm

38) The amplitude modulated transmission waves have frequencies range: (FAS 2016)
(a) 540 Hz to 1600 Hz (b) 540 kHz to 1600 kHz
(c) 540 Hz to 1600 MHz (d) 88 MHz to 108 MHz

39) Power factor is equal to: (FAS 2016)
(a) $\sin\theta$ (b) $\tan\theta$
(c) $\sec\theta$ (d) $\cos\theta$

40) At resonance frequency, the impedance of RLC series circuit is: (FAS 2016)
(a) Maximum (b) Minimum
(c) Zero (d) Infinite

41) In three phase AC generator the phase difference between each pair of coil is: (FAS 2016)
(a) 45° (b) 60°
(c) 90° (d) 120°

42) If I_o is the peak value of an A.C. supply then its rms value will be given as I_{rms}. (FAS 2017)
(a) $\frac{I_o}{\sqrt{2}}$ (b) $\sqrt{2}\,I_o$
(c) $\frac{I_o}{2}$ (d) $2I_o$

43) During each cycle, the alternate voltage reaches a peak value: (FAS 2017)
(a) Once (b) Twice
(c) Thrice (d) Four times

44) Root mean square value of voltage is given by: (RAW 2014)
(a) $V_{rms} = 2V_o$ (b) $V_{rms} = \sqrt{2}\,V_o$
(c) $V_{rms} = \frac{V_o}{\sqrt{2}}$ (d) $V_{rms} = \frac{V_o}{2}$

45) Inductive reactance of an inductor is: (RAW 2014)
(a) $x_L = \pi fL$ (b) $x_L = 4\pi fL$
(c) $x_L = 2\pi fL$ (d) $x_L = 2\pi L$

46) If I_o is the peak value of A.C current, then the root mean square (rms) value of current will be: (RAW 2017)
(a) $I_{rms} = I_o/2$ (b) $I_{rms} = \frac{\sqrt{2}}{I_o}$
(c) $\sqrt[2]{I_o}$ (d) $I_{rms} = \frac{I_o}{\sqrt{2}}$

47) At resonance the value of current in RLC series circuit is equal to: (SAG 2013 GI)
(a) $\frac{V_o}{R}$ (b) V_oR
(c) $\frac{1}{2}$ (d) Zero

48) If $V_{rms} = 10\sqrt{2}$ volts, then peak voltage V_o will be: (SAG 2016)
(a) 10 Volts (b) 20 volts
(c) 30 Volts (d) $10/\sqrt{2}$ Volts

49) A device that allows only flow of D.C through a circuit is: (SAG 2012)
(a) Inductor (b) Capacitor
(c) A.C generator (d) Transformer

50) In three phase A.C supply, the phase difference in voltage of any two phases is: (2013 GII)
(a) 90° (b) 120°
(c) 180° (d) 360°

51) The phase of AC at positive peak from origin is (SAG 2017)
(a) $\frac{3\pi}{2}$ (b) $\frac{\pi}{2}$
(c) $\frac{\pi}{4}$ (d) π

52) In pure capacitor AC circuit, the current I and charge q are (SAG 2017)
(a) In phase (b) Out of phase
(c) Parallel to each other (d) None of above

53) X_L is low for low frequency f, but X_c is (SAG 2017)
(a) High (b) low
(c) Zero (d) Same as X_L

54) Reactance of inductor is very high when there is: (DGK 2012 GII)
(a) High frequency current
(b) Low frequency current
(c) High frequency inductor
(d) Low frequency inductor

55) In R-L series circuit phase angle is given by: (DGK 2015 GII)
(a) $\theta = \tan^{-1}\frac{1}{WLR}$ (b) $\theta = \tan^{-1} WLR$
(c) $\theta = \tan^{-1}\frac{R}{WL}$ (d) $\theta = \tan^{-1}\frac{WL}{R}$

56) Average value of current and voltage over a complete cycle is: **(DGK 2015 GII)**
(a) Positive (b) Negative
(c) Zero (d) Infinite

57) In RLC series circuit, at low frequency: **(SAG 2014 GII)**
(a) $X_c < X_L$ (b) $X_c > X_L$
(c) $X_c = X_L$ (d) None of these

58) In three phase A.C supply coils are inclined at an angle of: **(DGK 2015 GII)**
(a) 0° (b) 90°
(c) 120° (d) 180°

59) The reactance Xc of capacitor is given by: **(DGK 2012 GI)**
(a) $X_c = 2\pi fc$ (b) $X_c = \pi fc$
(c) $X_c = \frac{1}{2\pi fc}$ (d) $X_c = \frac{1}{2\pi f}$

60) When we accelerate the charges, which type of waves are produced : **(DGK 2015 GI)**
(a) Mechanical waves (b) Travelling waves
(c) Stationary waves (d) Electromagnetic waves

61) The basic circuit element in an A.C circuit is: **(DGK 2014 GII)**
(a) Capacitor (b) Resistor
(c) Inductor (d) All of these

62) In the capacitive circuit of A.C quantity when q = 0 the slop of q-t curve is: **(SAG 2014 GI)**
(a) Maximum (b) Minimum
(c) Zero (d) Negative

63) The reactance X_c of capacitor c when connected across an AC source of frequency 'f' is given by: **(DGK 2013 GII)**
(a) $2\pi fC$ (b) $\frac{1}{2\pi fc}$
(c) $\frac{2\pi f}{c}$ (d) $\frac{C}{2\pi f}$

64) In D.C circuits, current and voltage are controlled by: **(DGK 2013 GII)**
(a) Capacitor (b) Inductor
(c) Resistor (d) Gate

65) Which consumes small power? **(DGK 2017)**
(a) Inductor (b) Resistor
(c) Motor (d) All of them

66) A capacitor is perfect insulator for **(DGK 2017)**
(a) Alternating current (b) Sparking current
(c) Eddy current (d) Direct current

67) When an inductor comes close to a metallic object, its inductance is: **(DGK 2017)**
(a) Decreased (b) Increased
(c) Becomes half (d) Becomes 4 times

68) A device which opposes the flow of A.C. is: **(DGK 2017)**
(a) resistor (b) capacitor
(c) inductor (d) None

69) In RLC series circuit, the condition for resonance is: **(DGK 2017)**
(a) $X_L < X_C$ (b) $X_L > X_C$
(c) $Z > X_C$ (d) $X_L = X_C$

70) In capacitor: **(SAW 2014)**
(a) Current leads voltage by $\frac{\pi}{2}$
(b) Curmet lags voltae by $\frac{\pi}{2}$
(c) Current leads the voltage by π
(d) Both are in phase

71) Capacitor will have a large reactance at: **(SAW 2014)**
(a) Low frequency (b) High frequency
(c) Zero frequency (d) Negative frequency

72) If V_{rms} is the root mean square value of voltage peak of voltage is: **(SAW 2013)**
(a) $\sqrt{2}\,V_{rms}$ (b) $2V_{rms}$
(c) $\frac{V_{rms}}{\sqrt{2}}$ (d) $\frac{\sqrt{2}}{V_{rms}}$

73) The phase at negative peak will be: **(SAW 2013)**
(a) $\pi/2$ (b) $\pi/3$
(c) $3\pi/2$ (d) π

74) At high frequency the value of reactance of capacitor will be: **(SAW 2016)**
(a) small (b) zero
(c) large (d) infinite

75) The basic circuit element in a D.C circuit which controls the current and voltage is: **(SAW 2016)**
(a) capacitor (b) resistor
(c) inductor (d) transistor

76) At what frequency, 1 H inductance offers same impedance as 1μF capacitor: **(LHR 2018)**
(a) 50 Hz (b) 159 Hz
(c) 512 Hz (d) 590 Hz

77) The impedance Z can be expressed as: **(LHR 2018)**
(a) $Z = \frac{V_{rms}}{I_{rms}}$ (b) $Z = \frac{I_{rms}}{V_{rms}}$
(c) $Z = I + V$ (d) $Z = I - V$

78) The unit of $\sqrt{LC}$ is: **(LHR 2018)**
(a) Second (b) Ampere
(c) Hertz (d) Farad

79) The phase at the positive peak is: **(MUL 2018)**
(a) Zero (b) π
(c) 2π (d) $\frac{\pi}{2}$

80) In three phase A.C. supply, if first coil has phase 0°, then the other two coils will habe phases: (MUL 2018)
(a) 0° and 120° (b) 120° and 240°
(c) 240° and 360° (d) 0° and 360°

81) The unit of impedance is: (MUL 2018)
(a) Volt (b) Ohm
(c) Farad (d) Watt

82) At resonance, the behaviour of R—L—C series circuit is: (MUL 2018)
(a) Resistive (b) Capacitive
(c) Inductive (d) Modulative

83) The device which allows only the flow of D.C. is: (BAH 2018)
(a) Capacitor (b) Transformer
(c) Inductor (d) Generator

84) If the frequency of A.C. Supply is doubled then the reactance of the capacitor: (BAH 2018)
(a) Half (b) Two times
(c) Four times (d) One fourth

85) In three phase A.C. generator, phase difference between each pair of the coil is: (BAH 2018)
(a) 90° (b) 270°
(c) 120° (d) 180°

86) The inductive reactance of a coil is directly proportional to: (BAH 2018)
(a) Inductance (b) Resistance
(c) Frequency of A.C
(d) Both frequency of A.C. and inductance

87) During each cycle, alternating voltage reaches to peak value: (FAS 2018)
(a) Once (b) Twice
(c) Thrice (d) Four times

88) The advice which allows only the continuous flow of AC through it is: (FAS 2018)
(a) Capacitor (b) Inductor
(c) Battery (d) Thermistor

89) In A.C, inductor behaves as: (RAW 2018)
(a) Capacitor (b) Resistor
(c) Commutators (d) Transistor

90) At resonance in RLC series circuit, phase difference between voltage and current is: (SAG 2018)
(a) 0° (b) 90°
(c) 120° (d) 180°

91) An A.C. voltmeter reads 220 V, its peak value will be: (SAG 2018)
(a) 255 V (b) 311.12V
(c) 300 V (d) 200 V

92) S.I. unit of reactance is: (SAG 2018)
(a) Farad (b) Volt
(c) Ampere (d) Ohm

93) In a resonance circuit of frequency 1000 KHz with inductor of 5mH, the capacitance will be (DGK 2018)
(a) 10.1 pF (b) 8.16 pF
(c) 3.3 pF (d) 5.09 Pf

94) Basic circuit element in a D.C circuit which controls the current and voltage is: (SAH 2018)
(a) capacitor (b) resistor
(c) inductor (d) transistor

95) SI unit of impedance is: (SAH 2018)
(a) Henry (b) Hartz
(c) Ampere (d) Ohm

96) The velocity of an oscillating charge as it moves to and fro along the wire is: (LHR 2019 GI)
(a) Infinite (b) Constant
(c) Changing (d) Zero

97) At what frequency will an inductor of 1.0 H have a reactance of 500Ω. (LHR 2019 GI)
(a) 50 Hz (b) 80Hz
(c) 500 Hz (d) 1000 Hz

98) The sum of negative and positive peak value is: (LHR 2019 GI)
(a) Average value (b) rms value
(c) peak value (d) p-p value

99) In RLC series circuit, at higher frequencies: (RAW 2019 GI)
(a) $X_L = X_C$ (b) $X_L > X_C$
(c) $X_L < X_C$ (d) $X_L = 0$

100) Which device permits the flow of D.C? (RAW 2019 GI)
(a) Capacitor (b) Photocell
(c) Inductor (d) Transformer

101) The impedance of R – L series circuit is: (MUL 2019 GI)
(a) $Z = \sqrt{R^2 + X_L^2}$ (b) $Z = \sqrt{R^2 + X_C^2}$
(c) $Z = \sqrt{R + X_L}$ (d) $Z = R$

102) The capacitance required to construct a resonance circuit of frequency 1000 kHz with an inductor of 5mH is: (MUL 2019 GI)
(a) 5.09 pF (b) 5.09 μF
(c) 5.09 mF (d) 50.9 pF

103) The device which allows only the flow of D.C. is: (SAG 2019 GI)
(a) Capacitor (b) Resistor
(c) Inductor (d) Generator

104) S.I unit of reactance is: (SAG 2019 GI)
(a) Farad (b) Volt
(c) Ampere (d) Ohm

105) In three phase voltage across any two lines is about: (DGK 2019 GI)

(a) 220 V (b) 230 V
(c) 400 V (d) 430 V

106) At high frequency, the current through a capacitor of A.C. circuit will: (DGK 2019 GI)

(a) Zero (b) Small
(c) Large (d) Infinity

107) At high frequency, the value of reactance of the capacitor in A.C. circuit is: (DGK 2019 GI)

(a) Low (b) High
(c) Zero (d) Medium

108) Which of the following waves do not travel at the speed of light: (DGK 2019 GI)

(a) Radio waves (b) X-rays
(c) Sound waves (d) Heat waves

109) In a three phase A.C. generator, if the phase of first coil is 0°, then the phase of other two coils will be: (SAW 2019 GI)

(a) 120° and 120° (b) 120° and 160°
(c) 120° and 240° (d) 120° and 360°

ENTRY TEST MCQ'S

1) Resistance in RC circuit of time constant 2 seconds is 1000 Ohms. What is value of C in the circuit? (2008)

(a) 2 μ farad. (b) 20 μ farad
(c) 200 μ farad (d) 2000 μ farad

2) The angular frequency of simple pendulum is directly proportional to ________. (2008)

(a) l (b) 1/l
(c) √l (d) √1/l

3) Frequency of L-C circuit will resonate under the driving action of the antenna by angular value of: (2009)

(a) Capacitance (b) Impedance
(c) Inductance (d) Resistance

4) In R-L Series circuit, the phase difference between applied voltage and current is given by the angle θ which is: (2009)

(a) $\theta = \tan^{-1}\frac{LR}{\omega}$ (b) $\theta = \tan^{-1}\omega LR$
(c) $\theta = \tan^{-1}\frac{WL}{R}$ (d) $\theta = \tan^{-1}\frac{\omega R}{L}$

5) A solenoid 15 cm long has 300 turns of wire. A current of 5 A flows through it. What is the magnitude of magnetic field inside the solenoid? (2014)

(a) 75×10^{7} T (b) 60×10^{-3} T
(c) $4\pi \times 10^{-3}$ T (d) $750\pi \times 10^{-3}$ T

SECTION II

SHORT QUESTIONS

From Exercise:

1. A sinusoidal current has rms value of 10A, ... is the maximum or peak value?
(LHR 2017, 2019 GI) (GUJ 2012, ...)
(FAS 2013) (RAW ...)
(SAG 2015, 2017, 2018, 2019 ...)
(DGK 2011, 2012 GII, 2015 GI, 2018) (SAW ...)

Ans. $I_{rms} = 10\text{ A}$

Peak – value $= I_o$

Formula:

$$I_{rms} = \frac{I_o}{\sqrt{2}}$$

$$\text{OR } I_{rms} = 0.707\, I_o$$

$$I_o = \frac{I_{rms}}{0.707}$$

Putting values, we get:

$$I_o = \frac{10\text{ A}}{0.707}$$

$$\boxed{I_o = 14.14\text{ A}}$$

2. Name the device that will (a) permit f... direct current but oppose the flow of altern... current (b) permit flow of alternating cur... but not the direct current. (LHR 2017, ...)
(MUL 2013) (FAS 2012, 2017, ...)
(DGK 2014 GII, 2015 GII, 2019 GI) (SAW 2019 G...)

Ans. (a) <u>Inductor</u> opposes the flow of alternating cur... but it permits direct current to flow through it.

$$X_L = 2\pi f L$$

for D.C., $f = 0$

$\therefore X_L = 0$

⇒ Current is maximum (allows D.C.)

(b) <u>Capacitor</u> opposes the flow of direct cur... but permits the flow of alternating current.

$$X_C = \frac{1}{2\pi f C}$$

for D.C. $f = 0$

$X_C = \infty$

⇒ Current is zero (opposes D.C.)

3. How many times per second will an incandes... lamp reach maximum brilliance when conne... to a 50 Hz source? (LHR 2012, ...)
(MUL 2012, 2016, 2018, 2019 GI) (BAH 2014, ...)
(RAW 2017, 2019 GI) (SAG 2013, 2017, 2019 ...)
(FAS 2014) (DGK 2013, 2019 GI)

Ans. It will reach maximum brilliance 100 times per sec...

Reason:

If the incandescent lamp is working ... alternating current of frequency 50 Hz, ...

Chapter 17

PHYSICS OF SOLIDS

From Panjab Boards:-

1) **Which one pair belongs to accepter impurity:** **(LHR 2015 GI)**
(a) Arsenic, phosphorus **(b) Boron, gallium**
(c) Antimony, indium (d) Arsenic, antimony

2) **Reciprocal of bulk modulus is:** **(LHR 2012)**
(a) Elasticity (b) Young modulus
(c) Compressibility (d) Shear modulus

3) **Curi temperature for iron is:** **(LHR 2012) (MUL 2014)**
(a) 0k (b) 570 k
(c) 1023 k (d) 378 k

4) **At 0K, semi conductors are:** **(LHR 2017)**
(a) Conductors (b). Insulators
(c) Perfect conductors **(d) Perfect insulators**

5) **In N-type material, minority charge carriers are:** **(LHR 2017)**
(a) Free electrons **(b) Holes**
(c) Protons (d) Mesons

6) **Which one is pentavalent impurity?** **(GUJ 2015)**
(a) boron (b) gallium
(c) antimony (d) indium

7) **The Young's modulus of steel is** **(GUJ 2015)**
(a) 2×10^{11} Nm^{-2} (b) 3.9×10^{9} Nm^{-2}
(c) 2×10^{9} Nm^{-2} (d) 1.5×10^{9} Nm

8) **Dimensions of strain are** **(GUJ 2012)**
(a) L^2 (b) L^{-2}
(c) $ML^{-1}T^{-2}$ **(d) no dimensions**

9) **When a silicon crystal is doped with a pentavalent element, it becomes.** **(GUJ 2012)**
(a) p-type semiconductor
(b) n-type semiconductor
(c) intrinsic semiconductor
(d) extrinsic semiconductor

10) **Best magnetic material is made up of: (MUL 2012)**
(a) Alnico V **(b) Iron**
(c) Nickel (d) Cobalt

11) **Young's modulus for water is:** **(MUL 2015 GII)**
(a) Zero (b) 1
(c) 2 (d) 3

12) **The S.I unit of strain is:** **(MUL 2013)**
(a) Nm (b) Nm^{-2}
(c) No unit (d) Kgms^{-2}

13) **Choose the correct answer:** **(MUL 2012 Supply)**
(a) A elastic deformation is reversible
(b) An elastic deformation is irreversible
(c) A plastic deformation is reversible
(d) A plastic deformation is irreversible

14) **The critical temperature of Aluminum is:** **(MUL 2015 GI)**
(a) 3.72 K **(b) 1.18 K**
(c) 7.2 K (d) 8.2 K

15) **Which type of impurity is to be added to a pure semi-conductor crystal to provide holes:** **(MUL 2016)**
(a) Monovalent **(b) Trivalent**
(c) Tetravalent (d) Pentavalent

16) **Above the curie temperature, Iron is: (MUL 2017)**
(a) Paramagnetic (b) Diamagnetic
(c) Ferromagnetic (d) Not effected

17) **The substance in which atom cooperate with each other in such a way so as to exhibit a strong magnetic field is called: -** **(MUL 2017)**
(a) Ferromagnetic (b) Paramagnetic
(c) Diamagnetic (d) Non-magnetic

18) **The number of atoms in domains of Macroscopic size of a ferromagnetic substance are:** **(BAH 2012)**
(a) 10^4 to 10^6 (b) 10^6 to 10^8
(c) 10^{12} to 10^{16} (d) 10^{21} to 10^{23}

19) **A pentavelent impurity is:** **(BAH 2014)**
(a) Boron (b) Aluminium
(c) Indium **(d) Phosphorus**

20) **A device used to detect very week magnetic field produced by brain is named as:** **(BAH 2015)**
(a) MRI (b) CAT Scans
(c) Squid (d) CRO

21) **Substances which undergo plastic deformation until they break are known as:** **(BAH 2016)**
(a) Brittle Substances **(b) Ductile Substance**
(c) Non-Magnetic Substance
(d) Magnetic Substance

22) **Conductors have conductivities of the order of:** **(FAS 2012)**
(a) $10^3\ (\Omega m)^{-1}$ (b) $10^{-7}\ (\Omega m)^{-1}$
(c) $10^7\ (\Omega m)^{-1}$ (d) $10^{-6}\ \Omega$

23) **Domains contain atom nearly:** **(FAS 2013)**
(a) 10^3 to 10^6 **(b) 10^{12} to 10^{16}**
(c) 10^9 to 10^{10} (d) $10^{-6}\ \Omega$

24) **Shear modulus is expressed as:** **(FAS 2012)**
(a) $G = \frac{\tan\theta}{F/A}$ (b) $G = \frac{\tan\theta}{A}$
(c) $G = \frac{F/A}{\tan\theta}$ (d) $G = \frac{F}{\tan\theta}$

25) Good conductors have conductivities of the order of: (FAS 2014)
(a) $10^{[illegible]} (\Omega m)^{-1}$ (b) $10^7 (\Omega m)^{-1}$
(c) $10^2 (\Omega m)^{-1}$ (d) $10^2 (\Omega m)^{-1}$

26) Domains are existed in: (FAS 2016)
(a) Ferromagnetic materials
(b) Diamagnetic materials
(c) Paramagnetic materials (d) Semiconductors

27) There are different crystal systems. The number of these crystal systems is: (RAW 2014)
(a) 3 (b) 4
(c) 5 (d) 7

28) The crystalline structure of NaCl is: (RAW 2017)
(a) Cubical (b) Hexagonal
(c) Triangonal (d) Tetragonal

29) The stress that produces change in shape is known as: (SAG 2013 GII)
(a) Tensile stress (b) Shear stress
(c) Volume stress (d) Longitudinal stress

30) The critical temperature for mercury is: (SAG 2013 GI)
(a) 7.2 K (b) 4.2 K
(c) 1.18 K (d) 3.7 K

31) The band in atom containing conductive electrons, according to "band theory of solids": (SAG 2012)
(a) Conduction band (b) Valance band
(c) Forbidden band
(d) First conduction band then forbidden band

32) Soft magnetic material is (SAG 2017)
(a) Iron (b) Sodium
(c) Steel (d) Copper

33) A solid having regular arrangement of molecules throughout is structure is called (SAG 2017)
(a) Amorphous solid (b) Polymeric solid
(c) Glassy solid (d) Crystalline solid

34) Strain energy in deformed matarial is proportional to: (DGK 2012 GII)
(a) Square of the extension
(b) Under root of the extension
(c) Cube root of the extension
(d) Extension produced

35) The amount of energy stored in the wire when it is deformed: (DGK 2014 GII)
(a) $W = \frac{1}{2} F_1 l_1^2$ (b) $W = \frac{1}{2} F_1^2 l_1$
(c) $W = \frac{1}{2} F_1 l_1$ (d) $W = 2F_1 l_1$

36) Out of the following which material is brittle: (DGK 2012 GI)
(a) High carbon steel (b) Aluminium
(c) Copper (d) Tungsten

37) The coercive current is: (DGK 2012 GI)
(a) Magnetizing current
(b) Current due to holes
(c) Demagnetizing current
(d) Current due to ions

38) Very weak magnetic field produced by brain can be detected by: (DGK 2012 GII)
(a) Compass (b) Metallic needle
(c) Squids (d) Liquids

39) Semiconductor resistivity ranges .... $(\Omega m)^{-1}$ (DGK 2013 GII)
(a) 10^{-6} to 10^{-4} (b) 10^6 to 10^4
(c) 10^{-6} t 10^{-8} (d) 10^{-8} to 10^{-16}

40) The SI of stress is same as that of: (DGK 2015 GII)
(a) Pressure (b) Force
(c) Momentum (d) Work

41) A single domain in ferromagnetic substance contains nearly: (DGK 2014 GI)
(a) 10^{08} to 10^{09} (b) 10^{12} to 10^{16}
(c) 10^{15} to 10^{20} (d) 10^{12} to 10^{20}

42) Curie temperature for iron is: (DGK 2015 GI)
(a) 710°C (b) 730°C
(c) 750°C (d) 780°C

43) In extrinsic semiconductors doping is of the order of: (DGK 2017)
(a) 1 atom to 10^4 (b) 1 atom to 10^8
(c) 1 atom to 10^3 (d) 1 atom to 10^6

44) The substances in which the atoms do not form magnetic dipoles are called: (DGK 2017)
(a) Diamagnetic (b) Paramagnetic
(c) Ferromagnetic (d) Crystals

45) The substance in which atoms co-operate with each other in such way so as to exhibit a strong magnetic field is called: (SAW 2014)
(a) Ferro magnetic (b) Para magnetic
(c) Dia magnetic (d) Non magnetic

46) How many crystal systems are there on the base of geometrical arrangement of the atoms: (SAW 2013)
(a) 3 (b) 5
(c) 4 (d) 7

47) Good conductors have conductivities of the order of: (SAW 2016)
(a) $10^1 (\Omega m)^{-1}$ (b) $10^5 (\Omega m)^{-1}$
(c) $10^7 (\Omega m)^{-1}$ (d) $10^9 (\Omega m)^{-1}$

48) Substances which break just after the elastic limit is reached is called as: (LHR 2018)
(a) Ductile substances (b) Hard substances
(c) Brittle substances (d) Soft substances

49) Very weak magnetic field produced by brain can be detected by: (LHR 2018)
(a) Compass (b) Metallic needle
(c) **Squids** (d) Liquids

50) In ferromagnetic substances, domain contains atoms nearly equal to: (MUL 2018)
(a) 10^8 to 10^{12} (b) 10^8 to 10^{14}
(c) **10^{12} to 10^{16}** (d) 10^4 to 10^{18}

51) Which one pair belongs to acceptor impurity: (BAH 2018)
(a) Arsenic, Phosphorous
(b) **Boron, Gallium**
(c) Antimony, Indium
(d) Arsenic, Antimony

52) Glass and high carbon steel are examples of: (BAH 2018)
(a) Ductile substances (b) **Brittle substances**
(c) Soft substances (d) Hard substances

53) The Curi temperature of iron is: (BAH 2018)
(a) 125°C (b) 163°C
(c) 750°K (d) **750°C**

54) A vacant or partially filled band is called: (FAS 2018)
(a) Fermi band (b) Valence band
(c) Forbidden band (d) **Conduction band**

55) A material which is insulator at OK and conduct at room temperature is: (RAW 2018)
(a) Silver (b) Lead
(c) **Germanium** (d) Polythene

56) If stress is increased beyond the elastic limit of material, it becomes permanently changed, this behaviour of material is called: (SAG 2018)
(a) Elasticity (b) **Plasticity**
(c) Yield strength (d) Ultimate tensile strength

57) Which pair of quantities has same dimensions? (SAG 2018)
(a) Stress, power (b) **Pressure, bulk modulus**
(c) Stress, strain (d) Strain, strain energy

58) The curi temperature of iron is: (DGK 2018)
(a) 125°C (b) 163°C
(c) 750 K (d) **750°C**

59) The most suitable metal for making permanent magnet is: (DGK 2018)
(a) Iron (b) Aluminium
(c) **Steel** (d) Copper

60) Good conductor have conductivities of the order of: (DGK 2018)
(a) 10^{-7} $(\Omega\ m)^{-1}$ (b) **10^7 $(\Omega\ m)^{-1}$**
(c) 10^2 $(\Omega\ m)^{-1}$ (d) 10^{-2} $(\Omega\ m)^{-1}$

61) out of the following which material is brittle: (DGK 2018)
(a) wrought iron (b) copper
(c) **high carbon steel** (d) tungsten

62) Good conductors have conductivities of the order of: (LHR 2019 GI)
(a) 10^{-7} $(\Omega m)^{-1}$ (b) **10^7 $(\Omega m)^{-1}$**
(c) 10^2 $(\Omega m)^{-1}$ (d) 10^{-2} $(\Omega m)^{-1}$

63) In p-type substances, the majority charge carriers are: (LHR 2019 GI)
(a) Electrons (b) Protons
(c) **Holes** (d) Neutrons

64) Which one belongs to trivalent group? (RAW 2019 GI)
(a) **Aluminium** (b) Antimoney
(c) Phosphorous (d) Arsenic

65) Substances which undergo plastic deformation until they break are called: (MUL 2019 GI)
(a) Brittle substances (b) Non-magnetic substances
(c) Magnetic substances
(d) **Ductile substances**

66) A vacant or partially filled band is called: (SAG 2019 GI)
(a) Fermi Band (b) Valence Band
(c) Forbidden Band (d) **Conduction Band**

67) Domains contain nearly: (DGK 2019 GI)
(a) 10^8 to 10^9 atoms (b) **10^{12} to 10^{16} atoms**
(c) 10^{15} to 10^{20} atoms (d) 10^{25} to 10^{30} atoms

68) A device used to detect very weak magnetic field produced by brain is named as? (DGK 2019 GI)
(a) MRI (b) CAT Scans
(c) **Squid** (d) CRO

69) Yttrium barium copper oxide ($YBa_2Cu_3O_7$) superconductor at temperature: (SAW 2019 GI)
(a) **163 K** (b) 77 K
(c) 4.2 K (d) 125 K

ENTRY TEST MCQ'S

1) **Force in terms of base unit is expressed as: (2008)**
(a) $kg\,ms^{-2}$ (b) $kg\,m^2s^{-2}$
(c) kgm^2s^{-3} (d) None of these

2) **A bullet train is lifted above the rails due to magnetic effect, thus friction is reduced to minium and speed can be enhanced up to: (2009)**
(a) 500 km min^{-1} (b) 500 km sec^{-1}
(c) 1000 km h^{-1} **(d) 500 km h^{-1}**

3) **The net charge on an N-type substance is: (2010)**
(a) 0.7 volts **(b) Zero**
(c) 0.25 volts (d) 0.07 volts

4) **Which of the following is the proper way to study the sinusoidal waveform of the voltage? (2011)**
(a) Voltage is connected to X input and the time base is switched off
(b) Voltage is connected to Y input and the time base is switched on
(c) Voltage is connected to Y input and the time base is switched off
(d) Voltage is connected to X input and the time base is switched on

5) **The ratio of tensile strength to tensile strain is called: (2012)**
(a) Modulus of elasticity(b) Bulk Modulus
(c) Young's Modulus (d) Shear Modulus

6) **A wire is stretched by a force 'F' which causes an extension Δl, the energy stored in the wire is:(2012)**
(a) FΔl (b) 2FΔl
(c) ½ $F\Delta l^2$ **(d) 1/2F × Δl**

7) **The stress-strain graph, deduced the following limits successively: (2013)**
(a) Proportional limit, yield limit, elastic limit
(b) Yield limit, elastic limit, proportional limit
(c) Proportional limit, elastic limit, yield limit
(d) Elastic limit, proportional limit, yield limit

8) **A 4.0 m long wire is subjected to stretching force and its length increases by 40 cm. The percent elongation which the wire undergoes is: (2013)**
(a) 0.10 % (b) 40 %
(c) 10 % (d) 20 %

9) **Magnetic Resonance Imaging (MRI) is used to identify the image of: (2014)**
(a) Tumors and inflamed tissue
(b) Blood cells
(c) Skin cells
(d) Bone structures

10) **The ratio of applied stress to the volumetric strain is called: (2016)**
(a) Bulk Modulus (b) Shear Modulus
(c) Tensile modulus (d) Young's Modulus

11) **The wire made of copper belong to which specific kind of material: (2016)**
(a) Ductile material (b) Tough material
(c) Brittle material (d) Deformed material

SECTION II

SHORT QUESTIONS

From Exercise:

2. Define stress and strain. What are their SI units? Differentiate between tensile, compressive and shear modes of stress and strain?
(GUJ 2016) (BAH 2018) (SAG 2018)

Ans. **Stress:** It is defined as the force applied per unit area to produce any change in shape, volume or length of a body.

Mathematically

$$\text{Stress } (\sigma) = \frac{\text{Force}}{\text{Area}} = \frac{F}{A}$$

Units: Stress is measured in Nm^{-2} or Pascal (Pa)

Strain:

Strain is a measure of the deformation of solid when stress is applied to it.

Units:

It is dimensionless because it is the ratio between two similar quantities so it has no units.

Tensile Stress:

When a stress changes length, it is called the tensile stress.

Compressional Stress:

When a stress compresses to the ends of a bar then it is called the compressional stress.

Volumetric stress:

When stress changes the volume, it is called volummetric stress

Shear Stress:

When a stress changes the shape, it is called shear stress.

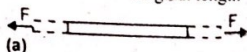
Tensile Strai

In case of deformation in one dimension, strain is defined as:

"The fractional change in length".

If $\Delta\ell$ is the change in length and ℓ is original length, then

$$\text{Tensile strain } (\varepsilon) = \frac{\text{Change in length}}{\text{Original length}}$$

F F
(a)

$$\varepsilon = \frac{\Delta\ell}{\ell} \quad \text{——(1)}$$

Compressional Strain:

If strain is produced as a result of compressive stress σ, it is termed as compressive strain.

Chapter 18

ELECTRONICS

From Punjab Boards:

1) The thickness of base in a transistor is of the order of: (LHR 2015 GI)
   (a) 10^{-7}m (b) 10^{-9}m
   (c) 10^{-6}m (d) 10^{-6}mm

2) Light emitting diodes (LED) are made from semiconductors: (LHR 2015 GII)
   (a) Silicon (b) Germanium
   (c) Carbon (d) Gallium arsenide

3) For non-inverting amplifier if R1 = ∞ ohm, then gain of amplifier is: (LHR 2012)
   (a) −1 (b) Zero
   (c) +1 (d) 0

4) Potential difference across two terminal of silicon diode at 300 k is: (LHR 2015 GI)
   (a) 0.3 V (b) 0.7 V
   (c) 0.9 V (d) 1.2 V

5) A diode characteristic curve is plotted between: (LHR 2016)
   (a) Current and time (b) Voltage and time
   (c) Voltage and current
   (d) Forward voltage and reverse voltage

6) Transistors are made from: (LHR 2016)
   (a) Plastics (b) Metals
   (c) Insulators (d) Doped semi-conductors

7) The pulsating output voltage of a rectifier can be made smooth by using a circuit known as: (LHR 2017)
   (a) Capacitor and inductor
   (b) Inductor
   (c) Filter (d) Resistor

8) The size of base region in a transistor is of the order of: (LHR 2017)
   (a) 10^{-6}m (b) 10^{-4}m
   (c) 10^{-3}m (d) 10^{-2}m

9) The device used for converting A.C. into D.C. is called: (LHR 2017)
   (a) Oscillator (b) Detector
   (c) Amplifier (d) Rectifier

10) In photovoltaic cell, current is directly proportional to (GUJ 2015)
   (a) wavelength of light (b) intensity of light
   (c) frequency of light (d) energy

11) Greater concentration of impurity is added in: (MUL 2015 GII)
   (a) Base (b) Emitter
   (c) Collector (d) LED

12) The current gain β of a transistor is: (MUL 2012 Supply)
   (a) I_C/I_B (b) I_E/I_B
   (c) I_C/I_E (d) I_B/I_C

13) The size of base in a transistor is: (MUL 2015 GI)
   (a) 10^{-9}m (b) 10^{-7}m
   (c) 10^{-8}m (d) 10^{-6}m

14) Logic Gates can control some physical parameters like: (MUL 2012, 2017)
   (a) Temperature pressure
   (b) Current, Voltage
   (c) Resistance, inductance
   (d) Capacitance, impedance

15) The ratio β in transistor is called: (MUL 2015 GII)
   (a) Current gain (b) Voltage gain
   (c) Nuclear gain (d) Emitter gain

16) Potential difference across depletion region in case of Silicon: (MUL 2014, 2015 GI)
   (a) 0.6 V (b) 0.7 V
   (c) 0.8 V (d) 0.9 V

17) Gain of operational amplifier is independent of: (MUL 2012)
   (a) Internal structure (b) External structure
   (c) Batteries (d) Potential changes

18) The potential difference across the depletion region of Germanium is: (MUL 2015 GII)
   (a) 0.3 V (b) 0.5 V
   (c) 0.7 V (d) 0.8 V

19) In n-p-n transistor current does not flow in the direction from: (MUL 2013)
   (a) Emitter to collector (b) Emitter to base
   (c) Base to collector (d) Collector to emitter

20) For non inverting amplifier, if R1 = ∞ ohm, R2 = 0 ohm then gain of amplifier is: (MUL 2014 GI)
   (a) −1 (b) Zero
   (c) +1 (d) Infinite

21) The process of converting an Alternating current into direct current is known as: (MUL 2013)
   (a) Amplification (b) Rectification
   (c) Filtration (d) All of these

22) The thickness of the base of the transistor is of the order of:- (MUL 2016)
   (a) 10^{6}m (b) 10^{-6}m
   (c) 10^{-3}m (d) 10^{-6} μm

23) To get N-type, the Ge is doped with: (MUL 2016)
   (a) Aluminium (b) Arsenic
   (c) Boron (d) Indium

24) A photodiode can turn its current ON and OFF in:- (MUL 2017)
(a) Micro seconds (b) Mega seconds
(c) Nano seconds (d) Milli seconds

25) An expression for current gain of a Transistor is given by: (MUL 2017)
(a) $\beta = \frac{I_B}{I_C}$ (b) $\beta = \frac{I_C}{I_B}$
(c) $\beta = I_B + I_C$ (d) $\beta = I_B - I_C$

26) A sensor of light is: (BAH 2014)
(a) Transistor (b) LED
(c) Diode (d) None
(d) Light dependent resistance

27) The barrier potential of silicon diode at room temperature is: (BAH 2015)
(a) 0.3V (b) 0.7V
(c) 3V (d) 7V

28) If I_E, I_B and I_C are emitter current, base current and collector current respectively in a transistor then: (BAH 2012)
(a) $I_C = I_B.I_E$ (b) $I_B = I_E.I_C$
(c) $I_E = I_B.I_C$ (d) $I_E = I_B + I_C$

29) When a PN-Junction is reverse biased, the depletion region is: (BAH 2014)
(a) Widened (b) Narrowed
(c) Normal (d) None of these

30) The potential barriers for germanium at room temperature is:(FAS 2013, 2014, 2016) (SAW 2016)
(a) 0.3 volt (b) 0.5 volt
(c) 0.7 volt (d) 0.9 volt

31) A device used for the conversion of AC into DC is called: (FAS 2014)
(a) An oscillator (b) Detector
(c) An amplifier (d) Rectifier

32) Minimum number of semi-conductor diodes required for full wave rectification are: (FAS 2015, 2016)
(a) 1 (b) 2
(c) 3 (d) 4

33) The input resistance of an op-amplifier is: (FAS 2016)
(a) Zero (b) Low
(c) High
(d) Equal to output resistance

34) AC can be converted into DC by: (FAS 2016)
(a) Transformer (b) Rectifier
(c) Motor (d) Capacitor

35) Automatic function of streetlight can be done by use of: (FAS 2017)
(a) Inductor (b) Capacitor
(c) Comparator (d) Thermistor

36) The potential barrier for silicon is: (RAW 2014)
(a) 0.3 V (b) 0.5 V
(c) 0.7 V (d) 0.8 V

37) Pulsating out put of full wave rectifier can be made smooth by using circuit called: (RAW 2014)
(a) Filter (b) Amplifier
(c) Resister (d) Transistor

38) A diode characteristics curve is a plot between: (FAS 2017)
(a) Current and resistance
(b) Voltage and time
(c) Voltage and current
(d) Current and time

39) Voltage gain of the common emitter npn-transister as an amplifier is: (FAS 2017)
(a) $\beta\frac{rie}{Re}$ (b) $\beta\frac{Ic}{Rc}$
(c) $\beta\frac{Vc}{Rc}$ (d) $\beta\frac{Rc}{rie}$

40) A diode characteristics curve is a graph plotted between: (SAG 2012)
(a) Current and time (b) Voltage and time
(c) Voltage and current
(d) Forward voltage and reverse current

41) Gain of inverting op-amp in the $R_1 = \infty$ and $R_2 = 1$ (SAG 2013 GI)
(a) ∞ (b) 1
(c) 0 (d) -1

42) The open loop gain of an operational amplifier, is of the order of: (SAG 2013 GII)
(a) 10^8 (b) 10^5
(c) 10^2 (d) 10^{-3}

43) The automatic working of street lights is due to: (SAG 2013 GI)
(a) Inductor (b) Capacitor
(c) Comparator (d) Rectifier

44) The value of potential barrier for silicon at room temperature is (SAG 2017)
(a) 0.7 V (b) 0.5 V
(c) 0.3 V (d) 0.9 V

45) The circuit which compares the two voltages is (SAG 2017)
(a) LDR (b) Sensor
(c) Comparator (d) Logic gate

46) **The central region of transistor is known as** **(SAG 2017)**
(a) Emitter (b) **Base**
(c) Collector (d) Depletion region

47) **The reverse current in a diode is due to** **(SAG 2017)**
(a) Minority charge carriers (b) Holes
(c) Majority charge carriers (d) Electrons

48) **Voltage gain of the transistor as an inverting amplifier is negative because of:** **(DGK 2012 GII)**
(a) Input voltage is amplified
(b) Phase shift of 180°
(c) Output voltage is amplified
(d) Phase shift is 0°

49) **Emitter current in transistor is given by Ie =:** **(DGK 2013 GII)**
(a) $\frac{I_c}{I_b}$ (b) $I_e I_c$
(c) $I_b + I_c$ (d) $I_c - I_b$

50) **For rectification we use:** **(DGK 2013 GII)**
(a) Transformer **(b) Diode**
(c) Choke (d) Generator

51) **Reverse current flows due to:** **(DGK 2014 GII, 2015 GI)**
(a) Majority charge carriers
(b) Minority charge carriers
(c) Electrons
(d) Holes

52) **The reverse current in a P-n junction flows due to:** **(DGK 2015 GII)**
(a) Majority charge carriers
(b) Minority charge carriers
(c) Both a & b
(d) None of these

53) **Which is not a basic logic operation:** **(DGK 2014 GII)**
(a) NOT (b) AND
(c) Or **(d) NAND**

54) **An expression for current gain of transistor is given by B = ________** **(DGK 2016)**
(a) $\frac{I_b}{I_c}$ (b) $I_e + I_c$
(c) $I_c I_e$ **(d) $\frac{I_c}{I_b}$**

56) **Automatic functioning of street light can be done by:** **(DGK 2017)**
(a) inductors (b) capacitors
(c) transistors **(d) comparators**

57) **The size of base of transistor is:** **(DGK 2017)**
(a) 10^{-3} m (b) 10^{-4} m
(c) 10^{-6} m (d) 10^{-2} m

58) **Which diode works at reverse biasing?** **(DGK 2017)**
(a) LED (b) photovoltaic cell
(c) photodiode (d) silicon diode

59) **An expression for current gain of a transistor is given by:** **(DGK 2017)**
(a) $\beta = I_B / I_C$ (b) $\beta = I_B \cdot I_C$
(c) $\beta = I_C - I_B$ **(d) $\beta = I_C / I_B$**

60) **The characteristic curve of p-n junction is between:** **(SAW 2013)**
(a) Voltage and current
(b) Voltage and time
(c) Current and time (d) Power and current

61) **The p-n junction on forward biasing acts as:** **(SAW 2013)**
(a) Capacitor (b) High resistor
(c) Inductor **(d) Low resistor**

62) **Transistors are made from:** **(SAW 2014)**
(a) Plastics (b) Metals
(c) Conductors **(d) Dopped semiconductors**

63) **The term transistor stands for:** **(SAW 2014)**
(a) Transfer of current (b) Transfer of voltage
(c) Transfer of resistance
(d) Transfer of charge

64) **The colour of light emitted by a LED depends on:** **(SAW 2016)**
(a) its forward biasing
(b) the type of semi conductor material used
(c) the amount of forward current
(d) its reverse biasing

65) **Automatic functioning of street light can be done by the use of:** **(LHR 2018)**
(a) Inductor (b) Capacitor
(c) Comparator (d) Thermistor

66) **For non-inverting amplifier, $R_1 = \infty$ and $R_2 = 0$ ohm, the gain of non-inverting amplifier is:** **(LHR 2018)**
(a) −1 (b) Zero
(c) +1 (d) Infinite

67) **The open loop gain of Op—Amp is of the order of:** **(MUL 2018)**
(a) 10^2 (b) 10^3
(c) 10^4 **(d) 10^5**

68) **The common emitter current amplification factor β is given by:** **(MUL 2018)**
(a) $\frac{I_C}{I_E}$ **(b) $\frac{I_C}{I_B}$**
(c) $\frac{I_E}{I_B}$ (d) $\frac{I_B}{I_E}$

69) **Photodiode is used for the detection of:** **(MUL 2018)**
(a) Light (b) Thermal radiation
(c) Radio waves (d) Sound waves

70) **______ is the building block of every complex electronic circuit.** **(MUL 2018)**
(a) Semiconductor diode
(b) Resistor
(b) Capacitor
(d) Amplifier

71) **Thickness of a base in a transistor is of the order of:** **(BAH 2018)**
(a) 10^{-3} m (b) 10^{-9} m
(c) 10^{-6} m (d) 10^{-6} mm

72) **For automatic switching of street light, the op-amplifier is used as:** **(BAH 2018)**
(a) Inverter (b) Convertor
(c) Comparator (d) Rectifier

73) **The resistance, between the inverting (−) and Non inverting (+) inputs is called input resistance and is of the order of:** **(BAH 2018)**
(a) Ohms (b) Kilo Ohms
(c) Thousands Ohms **(d) Mega Ohms**

74) **A device which is used for the conversion of AC into DC is called:** **(FAS 2018)**
(a) Oscillator (b) Detector
(c) Amplifier **(d) Rectifier**

75) **In put resistance of op-amplifier is of the order of:** **(RAW 2018)**
(a) Few ohms **(b) Mega ohm**
(c) Milli ohms (d) Micro ohms

76) **doping is made comparatively larger in:** **(RAW 2018)**
(a) Emitter (b) Base
(c) Collector (d) P-type semi-conductors

77) **When A = 0 , B = 1, then output of 'NAND' gate is:** **(SAG 2018)**
(a) 0 (b) 0.1
(c) 1 (d) 0.8

78) **In an inverting operational amplifier, R1 = 10 KΩ and R_2 = 100 KΩ, its gains is:** **(SAG 2018)**
(a) −10 (b) 10
(c) 100 (d) −100

79) **The reverse current through a semi conductor diode is due to:** **(SAG 2018)**
(a) Minority carriers (b) Majority carriers
(c) Holes (d) Electrons

80) **the potential barrier for silicon is:** **(SAG 2018)**
(a) 0.3 V **(b) 0.7 V**
(c) 1.0 V (d) 0.1 V

81) **Which component of the transistor has greater concentration of impurity?** **(DGK 2018)**
(a) Base **(b) Emitter**
(c) Collector
(d) both emitter and collector

82) **The potential barrier for silicon at room temperature:** **(DGK 2018)**
(a) 0.7 volt (b) 0.3 volt
(c) 5 volt (d) 1 volt

83) **The input resistance of op-amplifier is:(SAH 2018)**
(a) zero (b) Low
(c) Very high
(d) Equal to output resistance

84) **Which factor does not affect the conductivity of PN-junction diode:** **(LHR 2019 GI)**
(a) Doping (b) Temperature
(c) Voltage **(d) Pressure**

85) **The common emitter current amplification factor β is given by:** **(LHR 2019 GI)**
(a) $\frac{I_C}{I_E}$ **(b) $\frac{I_C}{I_B}$**
(c) $\frac{I_E}{I_B}$ (d) $\frac{I_B}{I_C}$

86) **The gain of non-inverting amplifier is:** **(LHR 2019 GI)**
(a) $1 + \frac{R_2}{R_1}$ (b) $1 + \frac{R_1}{R_2}$
(c) $\frac{-R_2}{R_1}$ (d) $\frac{-R_1}{R_2}$

87) **Colour of light emitted by LED depends upon:** **(RAW 2019 GI)**
(a) Its forward biasing (b) Its reverse biasing
(c) Type of material (d) Forward current

88) **The size of base of transistor is of the order of:** **(MUL 2019 GI)**
(a) 10^{-6} m (b) 10^{-5} m
(c) 10^{-4} m (d) 10^{-3} m

89) **A two inputs NAND gate with inputs A and B has an output 'O' if:** **(MUL 2019 GI)**
(a) A is O (b) B is O
(c) Both A and B are O **(d) Both A and B are 1**

90) **For normal operation of transistor, the Emitter-Base junction is always:** **(SAG 2019 GI)**
(a) Forward Biased (b) Reverse Biased
(c) Unbiased (d) Grounded

91) **The S.I unit of current gain is:** **(SAG 2019 GI)**
(a) Volt (b) Ampere
(c) Coulomb **(d) No unit**

92) **The size of base in transistor is:** **(DGK 2019 GI)**
(a) 10^{-9} m (b) 10^{-8} m
(c) 10^{-7} m **(d) 10^{-6} m**

93) **Photo diode can turn its current on and off in:** **(DGK 2019 GI)**
(a) Micro-sec **(b) Nano-sec**
(c) Pico-sec (d) Femto-sec

94) **The gain of an inverting amplifier of external resistances R_1 = 10 K Ω and R_2 = 100 K Ω is:** **(DGK 2019 GI)**
(a) −10 (b) −5
(c) −2 (d) 5

95) The potential barrier for germanium at room temperature is: **(DGK 2019 GI)**
- (a) 0.3 Volt
- (b) 0.5 Volt
- (c) 0.7 Volt
- (d) 0.9 Volt

96) **A p-n junction cannot be used as: (SAW 2019 GI)**
- (a) Amplifier
- (b) Rectifier
- (c) Detector
- (d) LED

97) **If R_1 = 10 K Ω and R_2 = 100 K Ω, then gain of inverting amplifier is: (SAW 2019 GI)**
- (a) −11
- (b) **−10**
- (c) 10
- (d) 11

ENTRY TEST MCQ'S

1) **Practically ______ current flows in a reverse biased p-n junction. (2008)**
- (a) No
- (b) Very large
- (c) Few milliamperes
- (d) **Both A and C**

2) **An n-type semi-conductor is made by doping silicon crystal with _______. (2008)**
- (a) Indium.
- (b) Aluminum
- (c) **Arsenic**
- (d) Both B and C.

3) **Which of the following is the most ductile? (2008)**
- (a) Glass
- (b) **Copper**
- (c) Cast Iron
- (d) Hight carbon steel

4) **In which of the following, output is similar to NAND gate if input A = 0 and input B = 1. (2008)**
- (a) NOR
- (b) XNOR
- (c) **XOR**
- (d) Both B and C

5) **In LED when an electron combines with a ______ during forward bias conduction, a photon of visible light is emitted. (2008)**
- (a) High voltage
- (b) Photon
- (c) **Hole**
- (d) Position

6) **If inputs A = 1, B = 0 and output X = 1, then it corresponds to the operation of a: (2009)**
- (a) AND Gate
- (b) **NAND Gate**
- (c) XNOR Gate
- (d) NOR Gate

7) **In a certain circuit, if the transistor has a collector current of 10 mA and base current of 50 μA, then the current gain of the transitor is: (2009)**
- (a) 250
- (b) 100
- (c) 150
- (d) **200**

8) **A signal that is applied at the inverting input terminal of an op-amplifier undergo amplification at the ouptu terminal with a phase shift of: (2009)**
- (a) 0°
- (b) 270°
- (c) 360°
- (d) **180°**

10) **In transistors, the base region is very thin, of the order of: (2010)**
- (a) 10^{-5} cm
- (b) **10^{-6} m**
- (c) 10^{-6} mm
- (d) 10^{-6} μm

11) **The closed loop gain of OP-AMP depends on: (2010)**
- (a) Internal structure of OP-AMP
- (b) **Externally connected resistances**
- (c) Voltage of power supplies
- (d) Input resistance

13) **What is the output of the truth table: (2014)**

A	B	Out x = AB + AB
0	0	
0	1	
1	0	
1	1	

(a)

X
0
1
1
0

(b)

X
1
0
0
1

(c)

X
1
1
1
0

(d)

X
0
1
1
1

14) **In population inversion (Ruby Laser) atoms can reside in the excited state for: (2015)**
- (a) 10^{-11}
- (b) **10^{-8}**
- (c) 10^{-3}
- (d) $10^{-[illegible]}$

15) **Which of the following is the truth table for the logic gate; (2015)**

(a)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

(b)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(c)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

(d)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

Chapter 19

DOWN OF MODERN PHYSICS

From Punjab Boards:

1) Einstein was awarded Nobel Prize in Physics in: (LHR 2015 GII)
(a) 1905 (b) 1911 (c) 1918 **(d) 1921**

2) The value of Wien's constant is: (LHR 2015 GII)
(a) 2.9×10^{-3}mK (b) 2.9×10^{3}mK
(c) 5.67×10^{-8}mK (d) 5.67×10^{-8}wm^{-2}K^{-4}

3) Unit of plank's constant is: (LHR 2012)
(a) Volt **(b) J.S**
(c) J/S (d) e.v

4) Potassium cathode in photocell emit electrons for a light: (LHR 2015 GI)
(a) Visible (b) Infra-red
(c) Ultra violet (d) X-rays

5) In Compton scattering, the Compton shift will be equal to Compton wavelength if the scattering angle is: (LHR 2012)
(a) Zero (b) 45°
(c) 60° **(d) 90°**

6) The rest mass energy of an electron positron pair is: (LHR 2015 GI)
(a) 0.51 Mev **(b) 1.02 Mev**
(c) 1.2 Mev (d) 1.00 Mev

7) The momentum of the moving photon is: (LHR 2016) (FAS 2012)
(a) Zero (b) $h\lambda$
(c) $\frac{\lambda}{h}$ **(d) $\frac{h}{\lambda}$**

8) All motions are: (LHR 2016)
(a) Absolute (b) Uniform
(c) Relative (d) Variable

9) Plank's constant h is expressed as: (LHR 2017)
(a) J.S (b) $\frac{J}{S}$
(c) $\frac{J}{C}$ (d) J.C

10) The factor $\frac{h}{m_oc}$ in Compton effect has the dimensions of: (LHR 2017)
(a) Pressure **(b) Length**
(c) Mass (d) Momentum

11) The reverse process of photo-electric effect is called: (LHR 2017)
(a) Pair production (b) Compton effect
(c) Annihilation of matter **(d) X-rays**

12) Joule-second is the unit of: (LHR 2017)
(a) Energy (b) Heat
(c) Planck's constant (d) Work

13) Maximum Kinetic energy of photoelectrons depends upon __________ of incident light. (GUJ 2012)
(a) frequency (b) intensity
(c) brightness (d) power

14) The momentum of photon is given by the equation. (GUJ 2015)
(a) P = mv **(b) $P=\frac{h}{\lambda}$** (c) $P=\frac{\lambda}{h}$ (d) $P=h\lambda$

15) The uncertainty principle relats uncertainties in the measurements of energy and (GUJ 2016)
(a) Velocity (b) Momentum
(c) Time (d) Mass of the particle

16) What is the more careful calculation by warner Heisenberg? (MUL 2012)
(a) $\Delta E.\Delta t\approx h$ (b) $\Delta X.\Delta p\approx h$
(c) $\Delta X.\Delta p\approx\hbar$ (d) $\Delta m.\Delta V\approx h$

17) The value of Planks' constant h is equal to: (MUL 2012 Supply, 2013)
(a) 6.63×10^{-34} Js (b) 6.63×10^{-30} Js
(c) 6.63×10^{-31} Js (d) 6.63×10^{34} Js

18) The number of electrons emitted depend upon: (MUL 2014 GI)
(a) Colour of target surface
(b) Shape of surface
(c) Frequency of incident light
(d) Intensity of incident light

19) The mass of a photon is: (MUL 2012 Supply, 2013)
(a) Zero (b) Very small
(c) Equal to the mass of electron
(d) Infinite

20) For an electron, the rest mass energy is: (MUL 2015 GI)
(a) 0.411 MeV **(b) 0.511 MeV**
(c) 0.611 MeV (d) 0.711 MeV

21) When Platinum is heated, it becomes orange is: (MUL 2015 GI)
(a) 500°C (b) 900°C
(c) 1100°C (d) 1300°C

22) Earth's orbital speed is: (MUL 2015 GII)
(a) 10 km/s (b) 20 km/s
(c) 30 km/s (d) 40 km/s

23) The rest mass of Photon is: (MUL 2015 GII)
(a) Zero (b) mc^2 (c) m_o (d) m

24) __________ has the largest de Broglie wavelength at same speed. (MUL 2016)
(a) Proton (b) α - particle
(c) Carbon Atom **(d) Electron**

25) **Platinum wire becomes white at a temperature of:** **(MUL 2017)**
(a) 1600°C (b) 1300°C
(c) 1100°C (d) 900°C

26) **Stefen – Boltzmann law is given by:** **(MUL 2017)**
(a) $E = hf$ (b) $E = mc^2$
(c) $E = \sigma T^4$ (d) $\lambda \times T$ = constant

27) **When the $K.E_{max}$ of photoelectron is zero, the frequency of incident photon is ________ that of threshold frequency:-** **(MUL 2017)**
(a) Less than (b) Greater than
(c) Much greater **(d) Equal to**

28) **Mementum of photon is given by:** **(BAH 2012)**
(a) $\frac{hf}{\lambda}$ **(b) $\frac{hf}{c}$** (c) $f\lambda$ (d) $h\lambda$

29) **Which of the following waves do not travel with the speed of light:** **(BAH 2014)**
(a) Radio waves (b) Heat waves
(c) X-rays **(d) Sound waves**

30) **In order to increase the K.E. of ejected photo electrons, there should be an increase in:** **(BAH 2015)**
(a) Intensity of Radiation
(b) Wavelength of Radiation
(c) Frequency of Radiation
(d) Both as B and C

31) **The principle regarding the dual nature of light was first discovered by:** **(BAH 2014)**
(a) Campton (b) J.J. Thomson
(c) De - Broglie (d) Heisenberg

32) **Compton effect is observed with:** **(BAH 2012)**
(a) X-rays (b) Visible light
(c) Radio waves (d) All of these

33) **Using relativistic effects the location of an air craft after an hr flight can be pedicted about:** **(BAH 2015)**
(a) 20 m **(b) 50 m**
(c) 760 m (d) 780 m

34) **Comptons shift in Wave Length ($\Delta\lambda$) is zero, when scattered angle of photon is:** **(BAH 2016)**
(a) 90 (b) 180
(c) 0° (d) 45

35) **Compton's effect is associated with:** **(FAS 2015, 2016)**
(a) Gamma rays (b) Beta rays
(c) x-rays (d) Positive rays

36) **The value of Plank's constant is given by:** **(FAS 2016) (BAH 2015)**
(a) 6.63×10^{-34} Js (b) 9.1×10^{-31} Js
(c) 6.63×10^{-19} Js (d) 9.1×10^{-27} Js

37) **Platinum wire becomes yellow at a temperature of:** **(FAS2014)**
(a) 900°C **(b) 1300°C**
(c) 1600°C (d) 500°C

38) **The Compton shift in wavelength will be maximum when angle of scattering:** **(FAS 2013)**
(a) 90° (b) 45° **(c) 180°** (d) 0°

39) **An electric eye operators because of:** **(FAS 2013)**
(a) Compton effect (b) Photo refraction
(c) Photo electric effect (d) r-rays counter

40) **The value of Stefan's constant is:** **(FAS 2016)**
(a) 5.67×10^{-6} $wm^{-2}k^{-4}$
(b) 5.67×10^{-8} $wm^{-2}k^{-4}$
(c) 5.67×10^{-10} $wm^{-2}k^{-4}$
(d) 5.67×10^{-4} $wm^{-2}k^{-4}$

41) **The change in wavelength of scattered photon in Compton effect is:** **(FAS 2016)**
(a) $\frac{h}{m_0 c}(1 - \cos\theta)$ (b) $\frac{h}{m_0 c^2}(1 - \cos\theta)$
(c) $\frac{m_0}{h_c}(1 - \cos\theta)$ (d) $\frac{h}{m_0^2}(1 - \cos\theta)$

42) **At higher energies more than 1.02 Mev the dominant process is:** **(RAW 2014)**
(a) Photo electric effect (b) Compton effect
(c) Pair production (d) Nuclear fission

43) **0.1 Kg mass will be equivalent to the energy:** **(RAW 2017)**
(a) 5×10^{8} Joules (b) 6×10^{17} Joules
(c) 9×10^{16} Joules **(d) 9×10^{15} Joules**

44) **The maximum Kinetic energy of emitted photoelectrons depends upon:** **(RAW 2017)**
(a) The intensity of incident light
(b) Frequency of the incident light
(c) Metal surface
(d) Both frequency of incident light and metal surface

45) **The total amount of energy radiated per unit area cavity radiator per unit time proportional to:** **(SAG 2013 GII)**
(a) T (b) T^2 (c) T^3 **(d) T^4**

46) **A maximum Compton shift in the wavelength of scattered photon will be occur:** **(SAG 2012)**
(a) $\theta = 0°$ (b) $\theta = 45°$
(c) $\theta = 90°$ (d) $\theta = 180°$

47) **The momentum of a photon of frequency 'f' is given by:** **(SAG 2013 GII)**
(a) $\frac{hc}{f}$ (b) $\frac{fc}{h}$
(c) $\frac{hf}{c}$ (d) Photon has no momentum

48) **The rest mass of photon is:** **(SAG 2012)**
(a) Infinity **(b) Zero** (c) hf (d) mC^2

49) **The minimum energy needed for a photon to create an electron-positron pair is:** **(SAG 2013 GI)**
(a) 1.02 Kev (b) 0.51 Kev
(c) 0.51 Mev **(d) 1.02 Mev**

50) The minimum energy required to create pair production is (SAG 2016, 2017)
(a) 1.02 Kev (b) 1.02 ev
(c) 1.02 Mev (d) 1.02 J

51) Momentum of moving photon is given by (SAG 2017)
(a) $\frac{h}{\lambda}$ (b) $\frac{hc}{\lambda}$
(c) hf (d) $\frac{h\lambda}{c}$

52) In the relations $\lambda_{max}XT$ = constant, the constant is known as: (DGK 2012 GI)
(a) Stefan- Boltzman constant
(b) Plank's constant
(c) Compton wavelength
(d) Wien's constant

53) Unit of Plank's constant is: (DGK 2012 GII)
(a) Volt (b) JS
(c) JS^{-1} (d) $J^{-1}S$

54) The converse of pair production: (DGK 2012 GII)
(a) Hertz effect (b) Compton effect
(c) Black body (d) Annihilation of matter

55) The condition $hf > 2 m_oc^2$ refers to: (DGK 2013 GII)
(a) Compton effect (b) Pair production
(c) Photoelectric effect (d) Annihilation of matter

56) Momentum of photon is: (DGK 2013 GII)
(a) h/c (b) c/h (c) hf/c (d) λ/h

57) The unit of work function is: (DGK 2014 GI)
(a) eV (b) Volt
(c) Farad (d) Hertz

58) 1kg is equivalent to the energy of: (DGK 2015 GII)
(a) 5×10^{8} J (b) 6×10^{16} J
(c) 9×10^{16} J (d) 1×10^{15} J

59) Which is the most refined form of matter? (DGK 2015 GI)
(a) Smoke (b) Fog
(c) Light (d) Electron

60) The minimum energy required by photon to create an electron-positron pair is: (DGK 2015 GII)
(a) 0.52 Mev (b) 1.51 Mev
(c) 1.02 Mev (d) 0.051 Mev

61) According to uncertainly principle the quantities which can not be simultaneously measured with accuracy are: (DGK 2012 GI)
(a) Energy and momentum
(b) Position and momentum
(c) Position and energy (d) Momentum and time

62) In photoelectric effect, if we increase the frequency of the incident light then ...... of the electrons increased: (DGK 2012 GII)
(a) Number (b) K.E
(c) P.E (d) Frequency

63) The Compton shift Δλ is equal to Compton wavelength at an angle of: (DGK 2017)
(a) Zero (b) 120°
(c) 45° (d) 90°

64) Rest mass energy of electron is: (DGK 2017)
(a) 1.02 Mev (b) 0.51 Mev
(c) 931 Mev (d) 200 Mev

65) Unit of Plank's constant is same as that of. (DGK 2017)
(a) Acceleration (b) Angular momentum
(c) Linear momentum (d) Entropy

66) When platinum wire is heated, it becomes _____ at 500° C? (SAW 2013)
(a) White (b) Green
(c) Yellow (d) Dull red

67) Every particle has corresponding antiparticle with: (SAW 2014)
(a) Same mass (b) Different mass
(c) Opposite charge
(d) Same mass and opposite charge

68) Rest mass of photon is: (SAW 2016)
(a) 1.67×10^{-27} kg (b) 9.1×10^{-31} kg
(c) infinite (d) zero

69) When platinum wire is heated, it changes to cherry red at temperature: (SAW 2016)
(a) 500°C (b) 900°C
(c) 1100°C (d) 1300°C

70) The photon with energy greater than 1.02 Mev can interact with matter as: (LHR 2018)
(a) Photoelectric effect (b) Compton effect
(c) Pair production (d) Annihilation of matter

71) The factor h / m_oC in Compton equation has the dimensions of: (LHR 2018)
(a) Pressure (b) Length
(c) Momentum (d) Plank constant

72) The wavelength associated with the proton moving at a speed of 40 m/s is: (LHR 2018)
(a) 7.20 nm (b) 9.02 nm
(c) 15.7 nm (d) 17.3 nm

73) When a metal is heated sufficiently electrons are given off by the metal. This phenomenon is known is: (LHR 2018)
(a) Photoelectric effect (b) Piezo electric effect
(c) Thermionic emission
(d) Secondary emission

74) The dimension of Planck's constant is same as that of: (LHR 2018)
(a) Energy (b) Power
(c) Acceleration (d) Angular momentum

75) The rest mass of photon is: (MUL 2018)
(a) Infinite (b) Small
(c) Zero (d) 1.67×10^{-27} kg

The speed of earth around its orbit is: (MUL 2018)
(a) 10 km/s (b) 20 km/s
(c) 25 km/s (d) 30 km/s

Application of waves nature of particle is: (MUL 2018)
(a) Photodiode (b) Simple microscope
(c) Compound microscope
(d) Electron microscope

The unit of Plank's constant "h" is': (MUL 2018)
(a) JC (b) J/C
(c) JS (d) J/S

The factor $\frac{h}{m_o c}$ in the Compton equation has the dimension of: (BAH 2018)
(a) Pressure (b) Length
(c) Mass (d) Momentum

The rest mass energy of an electron positron pair is: (BAH 2018)
(a) 0.51 Mev (b) 1.02 Mev
(c) 1.2 Mev (d) 1.00 Mev

The materialization of energy takes place in the process of: (BAH 2018)
(a) Photoelectric effect (b) Compton effect
(c) Pair production (d) Annihilation of matter

The maximum K.E. of photoelectron depends upon: (BAH 2018)
(a) Intensity of incident light
(b) Frequency of incident light
(c) Metal
(d) Temperature of metal

The unit of Plank's constant is: (FAS 2018)
(a) Joule (b) Joule-S
(c) Watt (d) Candela

Light of 4.5 ev is incident on a cesium, surface and stoping potential is 0.25V, maximum K.E of emitted electrons is: (RAW 2018)
(a) 4.5 ev (b) 4.25 ev
(c) 4.75 ev (d) 0.25 ev

Maximum Compton shift is observed at: (RAW 2018)
(a) 0° (b) 90° (c) 180° (d) 45°

The momentum of photon of frequency 'f' is: (SAG 2018)
(a) hc / f (b) hf / c
(c) f / hc (d) c / hf

The minimum energy required for pair production is: (SAG 2018)
(a) 1.02 MeV (b) 0.51 MeV
(c) 51 MeV (d) 102 MeV

Amount of energy released due toe complete conversion of 1 Kg mass into energy is: (SAG 2018)
(a) 9×10^{16} J (b) 9×10^{9} J
(c) 9×10^{20} J (d) 3×10^{8} J

90) 1 Kg mass will be equivalent to energy: (DGK 2018)
(a) 9×10^{12} J (b) 9×10^{16} J
(c) 9×10^{20} J (d) 9×10^{8} J

91) In Compton scattering, the value of compton's shift is equal to compton's wavelength, when X-rays is scattered at angle of: (DGK 2018)
(a) 0° (b) 30°
(c) 60° (d) 90°

92) When platinum wire is heated is becomes orange at: (DGK 2018)
(a) 500 °C (b) 900 °C
(c) 1100 °C (d) 1300 °C

93) The physical quantity, related to photon, that does not change in compton scattering is: (DGK 2018)
(a) Energy (b) Speed
(c) Frequency (d) Wavelength

94) Platinum wire becomes yellow at a temperature of: (SAH 2018)
(a) 1100 K (b) 1300 K
(c) 1573 K (d) 1873 K

95) Compton shift in the wavelength will be minimum when angle of scattering is: (SAH 2018)
(a) 90° (b) 60°
(c) 30° (d) 0°

96) The factor $\frac{h}{m_o c}$ in Compton equation has the dimension of: (LHR 2019 GI)
(a) Pressure (b) Length
(c) Mass (d) Momentum

97) The energy of photon is given by: (LHR 2019 GI)
(a) $\frac{1}{2} mv^2$ (b) $v_o e$
(c) $m_o c^2$ (d) hf

98) The numerical value of Stefen's constant is: (LHR 2019 GI)
(a) 5.67×10^{-8} (b) 2.9×10^{-3}
(c) 6.63×10^{-34} (d) 1.6×10^{-19}

99) At low temperature, a body emits radiations of: (RAW 2019 GI)
(a) Shorter wavelength (b) Longer wavelength
(c) High frequency
(d) High frequency & shorter wavelength

100) Compton wavelength is: (MUL 2019 GI)
(a) $\frac{h}{m_o C^2}$ (b) $\frac{hc}{m_o}$
(c) $\frac{h}{m_o c}$ (d) $\frac{hc}{m_o \lambda}$

101) The energy required for pair production is: (MUL 2019 GI)
(a) 0.51 MeV (b) 1.02 MeV
(c) 2.04 MeV (d) 3.06 MeV

102) **The materialization of energy takes place in the process of: (SAG 2019 GI)**
(a) Photoelectric effect (b) Compton effect
(c) Pair production (d) Annihilation of matter

103) **Joule-Second is the unit of: (SAG 2019 GI)**
(a) Energy (b) Heat
(c) Plank's constant (d) Power

104) **The factor $\frac{h}{m_o c}$ in Compton effect has the dimensions of: (SAG 2019 GI)**
(a) Pressure **(b) Length**
(c) Mass (d) Momentum

105) **Photoelectric effect shows: (DGK 2019 GI)**
(a) Corpuscular nature of light
(b) Dual nature of light
(c) Electromagnetic nature of light
(d) Wave nature of light

106) **Joule second is the unit of: (DGK 2019 GI)**
(a) Energy (b) Wien's constant
(c) Boyles law **(d) Plank's constant**

107) **Photovoltaic cell is formed from: (DGK 2019 GI)**
(a) Arsenic (b) Carbon
(c) Germanium **(d) Silicon**

108) **The wave-length of emitted radiation of maximum intensity is inversely proportional to the absolute temperature. This is known as: (DGK 2019 GI)**
(a) Faradays' law (b) Rayleigh Jean's law
(c) Stefan's law
(d) Wien's displacement law

109) **If temperature is doubled for a black body, then energy radiated per second per unit area becomes: (SAW 2019 GI)**
(a) $\frac{1}{2}$ times (b) $\frac{1}{4}$ times
(c) $\frac{1}{16}$ times **(d) 16 times**

110) **The angle of scattering for which the Compton shift is maximum, is: (SAW 2019 GI)**
(a) 180° (b) 90°
(c) 45° (d) 0°

ENTRY TEST MCQ'S

1) **For pohotons of energy greater than 1.02 MeV the probability of pair production occurenece ________ as the energy icreases. (2008)**
(a) Increase
(b) Completely diminishes
(c) Reduces to half
(d) Remains unchanged

2) **In photoelectric effect removal of photons is observed at ________ energies. (2008)**
(a) Low (b) High
(c) Intermediate **(d) Both A and C**

3) **Cesium coated oxidized silver emits electrosn for ________ light. (2008)**
(a) Infrared (b) Ultraviolet
(c) Visible (d) Green

4) **The units of E in $E=mc^2$ are: (2008)**
(a) $kg\ ms^{-2}$ (b) $N\ ms^{-2}$
(c) $kg\ m^2s^{-2}$ (d) Both B and C

5) **Object cannot be accelerated to the speed of light in free space is consequence of (2008)**
(a) Mass variation (b) Energy-mass relationship
(c) Inertia forces **(d) All of these**

6) **Einstein's photoelectric equation is given by: (2009)**
(a) $hf-\phi=\frac{1}{2}mv^2$ (b) $E=mc^2$
(c) $E=hc^2$ (d) $hf=\frac{1}{2}mv^2$

7) **The value of Stefan's Boltzmann Constant is: (2009)**
(a) $4.28\times10^{-7}\ Wm^{-2}K^{-4}$
(b) $4.28\times10^{-4}\ Wm^{-2}K^{-4}$
(c) $3.62\times10^{-4}\ Wm^{-2}K^{-4}$
(d) $5.67\times10^{-5}\ Wm^{-2}k^{-4}$

8) **In Compton Effect, the value of $\frac{h}{m_o c}$ is given by: (2009)**
(a) $1.43\times10^{-11}m$ (b) $2.56\times10^{-12}m$
(c) $2.43\times10^{-12}m$ (d) $3.46\times10^{-6}m$

9) **In pair production, the type of photon used: (2010)**
(a) α-particle (b) β-particle
(c) X-rays **(d) γ-radiations**

10) **The life time of an electron in an excited state is about 10^{-8}s. What is its uncertainty in energy during this time? (2010)**
(a) $1.05\times10^{-41}\ J$ **(b) $1.05\times10^{-26}\ J$**
(c) $1.15\ 10^{10}\ J$ (d) $2.19\times10^{-40}\ J$

11) **The minimum frequency below which no electron is emitted from the metal surface is called: (2010)**
(a) High frequency (b) Low frequency
(c) Threshold frequency (d) Resonance frequency

12) **The value of Wien's constant is: (2010)**
(a) $2.90\times10^{-3}\ mK$ (b) $3.34\times10^{-4}\ mK$
(c) $4.22\times10^{-7}\ mK$ (d) $3.42\times10^{-8}\ mK$

13) **If electrons of charge 'e' moving with velocity 'V' are accelerated through a potential difference 'V' and strike a metal target, then velocity of electrons is; (2015)**
(a) $\frac{Ve}{m}$ (b) $\sqrt{\frac{Ve}{m}}$
(c) $\sqrt{\frac{Ve}{2m}}$ (d) $\sqrt{\frac{2Ve}{m}}$

... sodium surface is illuminated with light of wavelength 300 nm. The work function of Sodium metal is 2.46 eV. Determine the cut off wavelength of Sodium. **(MUL 2017)**

... Define and explain Photo Electric Effect and determine maximum Kinetic Energy of Photo electrons. What are the experimental results of Photo Electric Effect? **(BAH 2012)**

What is the energy of a photon in a beam of infrared radiation of wavelength 1240 nm. **(BAH 2016)**

X-rays of wave length 22pm are scattered from a carbon target. The scattered addiction being viewed at 85° to the incident beam. What is compon shift?

(FAS 2012)

An electron is accelerated through a potential difference of 50v. Calculate its de-Broglie wavelength. **(FAS 2015)**

Write down the postulates of special theory of relativity and also describe the four results of special theory of relativity. **(LHR 2019 GI) (FAS 2014)**

What is the mass of a 70kg man is a space rocket traveling at 0.8c from us as measured form earth?

(SAG 2019 GI) (FAS 2016)

What is the photoelectric effect? Derive the Einstein's photoelectric equation.

(LHR 2018) (FAS 2017) (RAW 2017) (SAG 2017)

Explain black body also give the explanation of intensity distribution diagram with facts. **(SAG 2013 G-II)**

What is the energy of a photon in a beam of infrared radiation of wavelength 1240nm. **(DGK 2014 G-I)**

Find the mass m of a moving object with speed 0.8 c.

(SAW 2016)

A 50KeV photon is compton scattered by free electrons. If the scattered photon comes of at 45° what is its wave length?

(BAH 2018) (SAG 2018) (SAH 2018)

An electron is to be confined to a box of the size of the nucleus 1×10^{-14}m. What would be the speed of electron it is were so confined. **(LHR 2019)**

What is the maximum wavelength of two photons produced when a positron annihilates an electron. The rest mass energy of each is 0.51 MeV.

(MUL 2019)

Write down a note on construction, working and uses of photocell. **(DGK 2019)**

Chapter 20

ATOMIC SPECTRA

From Punjab Boards:-

1) Production of X-rays is reverse process of: **(LHR 2015 GI)**

(a) **Photo-electric effect** (b) Compton effect
(c) Annihilation (d) Pair production

2) In Helium-Neon laser, discharge tube is filled with Neon gas: **(LHR 2015 GII)**

(a) 10% (b) **15%**
(c) 85% (d) 90%

3) For holography we use a beam of: **(LHR 2012)**

(a) γ – rays (b) X – rays
(c) β – rays (d) **LASER**

4) The equation of Rydberg constant is given by : **(GUJ 2015)**

(a) $R_H = \frac{H_C}{m_o}$ (b) $R_H = \frac{E_o}{h_C}$

(c) $R_H = \frac{E_o}{\lambda}$ (d) $R_H = \frac{\lambda}{H_C}$

5) The radius of first shell of Hydrogen atom was quantised, which is: **(MUL 2014 GI) (SAG 2014)**

(a) 0.0053 mm (b) 0.053 mm
(c) 0.53 nm (d) **0.053 nm**

6) In an electronic transition, an atom cannot emit: **(MUL 2012 Supply)**

(a) γ – rays (b) Infrared rays
(c) UV-rays (d) **X-rays**

7) In Helium Neon Laser, the discharge tube is filled with: **(MUL 2014 GI)**

(a) 80% He, 20%Neon (b) **85% He, 15% Neon**
(c) 83% He, 17% Neon (d) 90% He, 10% Neon

8) The value of Rydberg Constant is: **(MUL 2012)**

(a) **$1.09 \times 10^7 m^{-1}$** (b) 1.6×10^{-19} C
(c) 1.05×10^{-34} J.S (d) 9.1×10^{-31} Kg

9) Photons emitted in inner shell transition are: **(MUL 2015 GI)**

(a) Continuous X – rays
(b) Discontinuous X – rays
(c) **Characteristic X – rays**
(d) Enrgetic X – rays

10) Atom can reside in metastable state for: **(MUL 2016)**

(a) 10^{-1} sec (b) 10^{-2} sec
(c) **10^{-3} sec** (d) 10^{-4} sec

11) The potential required to remove an electron from the atom is called: (MUL 2013)
(a) Critical potential (b) Ionization potential
(c) Absolute potential **(d) Excitation potential**

12) Production of X-rays is the reverse process of:- (MUL 2016)
(a) Compton effect (b) Pair production
(c) Pair annihilation **(d) Photo electric effect**

13) Radius of first Bohr's orbit is: (MUL 2017)
(a) 0.053nm (b) 0.053 mm
(c) 0.053 μm (d) 0.053 m

14) If an electron jumps from nth orbit of energy En to pth (lower) orbit of energy Ep and a photon of frequency 'f' and wavelength 'λ' is thus emitted then: (BAH 2012)
(a) $f\lambda = E_n - E_p$ (b) $\frac{hc}{\lambda} = E_n \cdot E_p$
(c) $hf = E_n - E_p$ (d) $h\lambda = E_p \cdot E_n$

15) LASER can be made by creating: (BAH 2015)
(a) Meta Stable State **(b) Population Inversion**
(c) Excited State (d) All of these

16) The speed of an electron in nth orbit is given as: (BAH 2015)
(a) $4\pi^2 Ke^2 nh$ **(b) $2\pi Ke^2/nh$**
(c) $4\pi Ke\, n^2h^2$ (d) $2\pi^2 Ke^2 nh$

17) Production of X-rays can be regarded as the inverse of: (BAH 2016)
(a) Compton Effect (b) Pair Production
(c) Photoelectric Effect
(d) Annihilation of Matter

18) The energy of electron in the 4th. Orbit of hydrogen atom is: (FAS 2013)
(a) −2.51 ev (b) −3.50 ev
(c) −13.6 ev **(d) −0.85 ev**

19) Helium-Neon laster discharge tube contains neon: (FAS 2012) (SAW 2016)
(a) 82% **(b) 15%** (c) 25% (d) 85%

20) In the metastable state the atoms can reside for: (FAS 2014)
(a) 10^{-3} S **(b) 10^{-3} S**
(c) 10^{-8} S (d) 10^{8} S

21) Which is not characteristic of LASER? (FAS 2016)
(a) Monochromatic (b) Coherent
(c) Intense **(d) Multi directional**

22) Speed of the electron in the first Bohr's orbit is: (RAW 2014)
(a) 2.19×10^{6} m/s (b) 2.19×10^{-6} m/s
(c) 2.19×10^{6} cm/s (d) 2.19×10^{-6} cm/sec

23) Laser is a beam of light which is: (RAW 2014)
(a) Monochromatic (b) Coherent
(c) Unidirectional **(d) All of these**

24) Balmer empirical formula explains the electromagnetic radiation of any excited atom in terms of their: (RAW 2017)
(a) Energy (b) Mass
(c) Wavelength (d) Momentum

25) The quantized radius of first Bohr orbit of a hydrogen atom is: (SAG 2012)
(a) 0.053 nm (b) 0.0053 nm
(c) 0.00053 nm (d) 0.53 nm

26) In a meta stable state an atom can reside for about: (SAG 2013 GII)
(a) 10^{-8}s (b) 10^{-10}s
(c) 10^{-9}s **(d) 10^{-3}s**

27) Second postulate of Bohr's atomic model is (SAG 2017)
(a) $mvr = \frac{nh}{2\pi}$ (b) $mvr = 2\pi\, nh$
(c) $mv = \frac{nhr}{2\pi}$ (d) $mvr = \frac{2\pi}{nh}$

28) X-ray diffraction reveals that these are (SAG 2017)
(a) Particle type **(b) Wave type**
(c) Both wave and particle (d) None of above

29) An atom can reside in excited state for: (DGK 2013 GII)
(a) 10^{-8} Sec (b) One second
(c) 10^{-3} Sec (d) 10^{-10} Sec

30) An excited atom reside in a meta stable state for: (DGK 2012)
(a) 10^{-6} s (b) 10^{-8} s **(c) 10^{-3} s** (d) 10^{-19} s

31) The radiation used to diagnose disease of eye is: (DGK 2012 GI)
(a) Ultra – violet rays (b) X-rays
(c) He-Ne laser (d) Radio waves

32) The SI unit of Ryd berg constant is: (DGK 2016)
(a) m^{-2} **(b) m^{-1}**
(c) NS (d) JS

33) The velocity of electron in 1st orbit of H-atom is: (DGK 2014 GI)
(a) 2.09×10^{6} m/sec **(b) 2.19×10^{6} m/sec**
(c) 2.18×10^{6} m/sec (d) 3.18×10^{6} m/sec

34) Helium Neon Laser beam emitted from a discharge tube has a colour: (DGK 2014)
(a) Blud (b) Green
(c) Red (d) Black

35) The value of radious of 1st bohr's orbit is: (DGK 2015 GI)
(a) 0.53 nm **(b) 0.053 nm**
(c) 0.0053 nm (d) 0.00053 nm

36) For Holography we use: (DGK 2017)
(a) X-rays **(b) Laser**
(c) λ – rays (d) β – rays

37) **In metastable state, electron resides: (SAW 2014)**
(a) 10^{-8} sec (b) 10^{-5} sec
(c) 10^{-3} sec (d) 10^{-11} sec

38) **The energy of the photon of wavelength 5090 nm is: (LHR 2018)**
(a) 3.10 eV **(b) 2.49 eV**
(c) 1.77 eV (d) 1.52 Ev

39) **In electron transition from power to higher orbit atom can not emit: (LHR 2018)**
(a) γ – rays (b) Ultraviolet rays
(c) Visible light (d) Infrared

40) **X-rays are similar in nature to: (MUL 2018)**
(a) γ – rays (b) β – rays
(c) α – rays (d) Cathode rays

41) **In Helium – Neon laser, the discharge tube is filled with: (MUL 2018)**
(a) 85 % of He (b) 80 % of He
(c) 90 % of He (d) 95 % of He

42) **The first orbit in the Hydrogen Atom has a radius: (BAH 2018)**
(a) 5.3×10^{-11}m (b) 5.3×10^{11}m
(c) 3.5×10^{-11}m (d) 3.5×10^{11}m

43) **The Rest Mass of X-ray photon is: (BAH 2018)**
(a) 9.1×10^{-31}Kg (b) 1.67×10^{-27}Kg
(c) 1.6×10^{-19}Kg **(d) zero**

44) **Which one is low energy photon? (FAS 2018)**
(a) Visible light **(b) Infrared light**
(c) Ultra violet light (d) X-rays

45) **Bremsstrahlung radiations are example of: (RAW 2018)**
(a) Atomic spectra (b) Molecular spectra
(c) Continuous spectra
(d) Discrete spectra

46) **Metastable state of Neon is: (SAG 2018)**
(a) 20.66 eV (b) 20.61 eV
(c) 18.70 eV (d) 1.60 eV

47) **In an electronic transition atom cannot emit: (SAG 2018)**
(a) Infrared radiation (b) Ultra violet radiation
(c) γ – ray (d) Visible light

48) **An electron in H-atom is excited from ground state to n = 4. How many spectral lines are possible in this case? (DGK 2018)**
(a) 6 (b) 5 (c) 4 (d) 3

49) **The mta-stable state is .... than normal excited state. (DGK 2018)**
(a) 10^{-5} times larger (b) 10^{-8} times smaller
(c) 10^{5} times larger (d) 10^{-3} times larger

50) **The value of Rydbergs constant is: (DGK 2018)**
(a) 1.0974×10^{7} m (b) 1.0974×10^{-7} m^{-1}
(c) 1.0974×10^{7} m^{-1} (d) 1.0974×10^{8} m^{-1}

51) **If electron jumps from 2^{nd} orbit to 1^{st} orbit in hydrogen atom, it emits a photon of: (SAH 2018)**
(a) 3.40 eV **(b) 10.20 eV**
(c) 13.6 eV (d) 10.4 Ev

52) **X-rays are the electromagnetic radiations having the wavelength in range: (LHR 2019 GI)**
(a) 10^{-12} m **(b) 10^{-10} m**
(c) 10^{-8} m (d) 10^{-6} m

53) **The life time of an electron in an excited state is about 10^{-8}s. What is its uncertainty in energy during this time: (LHR 2019 GI)**
(a) 6.63×10^{-34} J (b) 9.1×10^{-31} J
(c) 1.05×10^{-26} J (d) 7.2×10^{-15} J

54) **The numerical value of Rydberg's constant is: (LHR 2019 GI)**
(a) 1.0974×10^{7} (b) 1.0974×10^{-7}
(c) 1.0974×10^{14} (d) 1.0974×10^{-14}

55) **Energy of the 4^{th} orbit in hydrogen atom is: (LHR 2019 GI)**
(a) –2.51 eV (b) –3.50 eV
(c) –13.6 eV **(d) –0.85 eV**

56) **The diameter of an atom is of order of: (DGK 2019 GI)**
(a) 10^{-8} m **(b) 10^{-10} m**
(c) 10^{-12} m (d) 10^{-14} m

57) **Photons emitted in inner shell transition are: (DGK 2019 GI)**
(a) Continuous X-rays (b) Discontinuous X-rays
(c) Characteristics X-rays
(d) Energetic X-rays

ENTRY TEST MCQ'S

1) **When a helium atom loses an electron, it becomes: (2008)**
(a) An alpha particle (b) Proton
(c) A positive helium ion **(d) A negaive helium ion**

2) **LASER is a device which can produce: (2009)**
(a) Intense beam of light
(b) Intense, Coherent, Monochromatic bea of light
(c) Coherent beam of light
(d) onochromatic beam of light

3) **A crack allows greater amount of X-rays to pass, which appears on photographic film as: (2009)**
(a) Blue Area **(b) Dark Area**
(c) Bright Area (d) Red Area

4) **Velocity of electron moving in first orbit of hydrogen is: (2010)**
(a) 2.19×10^{7} m/sec (b) 2.18 × [illegible] m/sec
(c) 2.2×10^{8} m/sec (d) 2.19×10^{6} m/sec

5) **LASER is a potential energy source for inducing which type of reaction? (2010)**
   (a) Radioactive
   (b) Fission
   (c) Ionization
   (d) Fusion

6) **Life time of electron in metastable state is about: (2010)**
   (a) 10^{-5} sec
   (b) 10^{-3} sec
   (c) 10^{-8} sec
   (d) 10^{-2} sec

7) **What is meant by spontaneous emission of electrons in solids? (2011)**
   (a) Electrosn being emitted by the solids thorugh photoelectric effect when irradiated with electromagnetic radiation
   (b) Incident electrons colliding with electrosn in solids and releasing doubling the number of incident electrons
   (c) Electrons in solids are emitted without any external stimulus through radiation
   (d) Excited electrons going back to lower energy states immediately by releasing energy

8) **Which of the following is true for lasers? (2011)**
   (a) Electrons are emitted
   (b) Stimulated emission of electrons is needed
   (c) Coherent monochromatic light is emitted
   (d) There is a population inversion of photons

9) **When electrons lose all their kinetic energy in the first collision, the entire kinetic appears as an X-ray photon of energy: (2011)**
   (a) K.E = eV
   (b) $K.E = \frac{h\lambda_{min}}{c}$
   (c) $K.E = \frac{hc}{\lambda_{min}}$
   (d) $K.E = \frac{h}{\lambda_{max}}$

10) **In Helium-Neon laser, population inversion of ________ atoms is achieved which emit radiations, when they are stimulated to fall at lower level. (2011)**
   (a) Neon
   (b) Helium
   (c) Helium and Neon
   (d) Chromium

11) **Laser beam can be used to generate three-dimensional image of object in place called: (2011)**
   (a) Computed technology
   (b) Computed tomography
   (c) Holography
   (d) Computerized axial tomography

12) **The characteristic X-ray spectrum is due to: (2011)**
   (a) The absorption of neutrons by target material
   (b) The bombardment of target material by protons
   (c) The bombardment of target material by protons
   (d) The bombardment of target material by alpha particles

13) **LASER is an acronym for: (2012)**
   (a) Light amplification by stimulated emission of radiation
   (b) Light annihilation by stimulated emission of radiation
   (c) Light amplitude of stimulated emission of radiation
   (d) Light amplification by stimulated emission of radio

14) **X-rays can be produced by bombardment of ________ on target metal; (2012)**
   (a) Protons
   (b) Electrons
   (c) Neutrons
   (d) Alpha particles

15) **If an electron in the 'K' shell is removed and an electron from 'L' shell jumps to occupy the hole in the 'K' shell, it emits a photon of energy: (2012)**
   (a) $hf_{k\alpha} = E_L - E_k$
   (b) $hc = E_L - E_k$
   (c) $h/\lambda_{k\alpha} = E_L - E_L$
   (d) $hf_{k\alpha} = E_k - E_L$

16) **The kinetic energy K.E. with which the electron strikes the target is given by: (2012)**
   (a) $K.E. = e^2V$
   (b) K.E. = hc/A
   (c) $K.E. hf^2$
   (d) K.E. = eV

17) **Laser light is monochromatic which means: (2012)**
   (a) It consists of one ray of light
   (b) It consists of one wavelength
   (c) It consists of carbon monoxide gas
   (d) It consists of photons having 1 eV energy

18) **Which of the following property must be there in a substance so that it can be used target in X-rays tube? (2012)**
   (a) It must have low melting point
   (b) It must have low atomic number
   (c) It must have high reflecting ability
   (d) It must have high atomic number

19) **What is the type of characteristic X-ray photon whose energy is given by relation '$hf = E_M - E_k$'? (2012)**
   (a) K – alpha
   (b) M – alpha
   (c) K – beta
   (d) M – beta

20) **For what CAT stands in X-ray technology? (2013)**
   (a) Capacitor Ampifier Transistor
   (b) Computerized Axial Tomography
   (c) Cathode Anode Technique
   (d) Current Amplification Technology

21) **X-rays from a given X-ray tube operating under specified conditions have a minimum wavelength. The value of this minimum wavelength could be reduced by: (2013)**
   (a) Cooling the target
   (b) Reducing the temperature
   (c) Increasing the potential difference between the cathode and the target
   (d) Reducing the pressure in the tube

What will be the relation for the speed of electron accelerated towards the target in X-ray tube by applying potential difference 'V', take mass of electron 'm' and charge on electron 'e'? (2013)

(a) $\sqrt{\frac{2Ve}{m}}$ (b) $\sqrt{\frac{2me}{V}}$

(c) $\sqrt{\frac{2V}{me}}$ (d) $v = \sqrt{2meV}$

During the production of LASER, when the excited state E_2 contains more number of atoms than the ground state E_1, the state is known as: (2013)

(a) Population inversion

(b) Ground State

(c) Excited State (d) Metastable state

Process of generating three dimensional images of objects by using laser beam is called : (2014)

(a) Photography (b) 3-D cinema

(c) holography (d) Tomography

Bones absorb greater amount of incident X-rays than flesh. This is because of the fact that: (2014)

(a) Bones lie between the flesh

(b) Bones are light in color

(c) bones contain material of low densities

(d) Bones contain material of high densities

Which of the following techniques is the practical application of X-rays? (2014)

(a) Magnetic Resonance Imaging

(b) Ultrasonography

(c) Computerized Axial Topography

(d) Positron Emission Tomography

What will be the energy of accelerated electron used to produce X-rays when the accelerating potential is 2 kV? (2014)

(a) 2×10^{19} J (b) 1.6×10^{-19} J

(c) 3.2×10^{19} J **(d) 3.2×10^{-16} J**

One method of creating an inverted population is known as ________ and consist of illuminating the laser material with light. (2015)

(a) Optical Pumping (b) Excitation

(c) Bremsstrahlung (d) Holography

The potential difference between target and cathode of an X-rays tube is 20 kV and current is 20 mA. What is the λ_{min} of the emitted X-ray? (2015)

(a) 6.19×10^{-4}m (b) $6.19 \times 0\ 10^{-14}$m

(c) 6.19×10^{-11}m (d) 6.19×10^{-19}m

30) In X-ray tube, electrons after being accelerated through velocity 'v' strike the target, then the wavelength of emitted X-rays is: (2015)

(a) Not greater than $\frac{hc}{eV}$ (b) Not less $\frac{hc}{eV}$

(c) Equal to the $\frac{h}{mV}$ **(d) Equal to $\frac{hc}{eV}$**

31) In the case when the electrons lose all their kinetic energy (K.E.) in the first collision, the X-ray photon emitted has which of the following set of frequency and wavelength? (2015)

(a) f_{max}, λ_{min} (b) f_{max}, λ_{max}

(c) f_{min}, λ_{max} (d) f_{min}, λ_{min}

32) The shadow of the bones in X-rays photographic film appears lighter than the surrounding flesh due to: (2016)

(a) Bones reflect greater amount of X-rays

(b) Bones absorb less amount of X-rays

(c) Bones absorb greater amount of X-rays

(d) Bones totally reflect X-rays

33) The atom is excited to an energy level E_i from its ground state energy level E_o, the wavelength of the radiations emitted is: (2016)

(a) $\frac{(E_o - E_i)}{hc}$ (b) $\frac{(E_i - E_o)}{hc}$

(c) $\frac{hc}{(E_i - E_o)}$ (d) $\frac{(E_i)}{hc} - \frac{(E_o)}{hc}$

34) The continuous spectrum of X-ray is formed due to: (2016)

(a) Characteristics of X-rays

(b) Bremsstrahlung X-ray

(c) Soft X-ray (d) Hard X-ray

35) Wavelength of γ-rays is: (2016)

(a) Equal to the X-rays

(b) Longer to the X-rays

(c) Shorter to the X-rays

(d) Boarder to the X-rays

36) The X-rays consists of: (2016)

(a) High energy proton

(b) High energy electrons

(c) High energy γ-rays

(d) High energy photons

37) Which one of the following gas is the lasing or active medium in the laser tube? (2016)

(a) Hydrogen (b) Helium

(c) Neon (d) Carbon dioxide

38) The target of X-ray tube is made up of which metal? (2016)

(a) Iron (b) Nickel

(c) Brass **(d) Tungsten**

15. What are postulates of Bohr's model of the hydrogen atom. Show that radii of hydrogen atom are quantized? (SAW 2019 GI) (FAS 2016)
16. What do you mean by inner shell transitions? Also explain the production of x-rays. (FAS 2017)
17. Derive the relation for the quantized radii of hydrogen atom on the basis of Bohr's mode of hydrogen atom. (RAW 2014)
18. Write down the postulated of Bohr's atomic model. Show that Bohr radii and their energies are quantized. (RAW 2017)
19. (a)Define LASER and explain population inversion and laser action. (RAW 2017) (SAG 2012, 2018)
20. State the postulates of Bohr's model of hydrogen atom and explain De-Broglie's interpretation of Bohr's orbit to show that mvr = $\frac{nh}{2\pi}$ (SAG 2013 G-II)
21. What are X-rays? Describe the production of X-rays. (SAG 2017)
22. What are the inner shell transitions and characteristic x-rays. Describe the production of x-rays. (LHR 2018) (DGK 2013 G-II, 2014 G-I)
23. Write down the postulate of Bohr's theory and give the de-Broglie's interpretation. (DGK 2015 G-I)
24. Electron in an x-ray tube are accelerated through a potential difference of 3000V. If these electrons were slowed down in a target. What will be the minimum wavelength of the x-rays produced? (DGK 2014 G-I)
25. Evaluate the relation for nth orbit of H-atom and justify that radii are quantized. (DGK 2012 G-I)
26. Give the postulate of Bohr's model of the Hydrogen atom and how de-Broglie justify IInd postulate on basis of modern physics. (SAW 2016)
27. How much energy is absorbed by a man of mass 80 kg who receives a lethal in hole body at equivalent dose of 400 resistance in the form of low energy neutrons for which RBE factor is 10. (LHR 2019)
28. What is energy in eV of quanta of wavelength of λ = 500 nm. (MUL 2019)
29. The wavelength of K – X ray from copper is 1.377×10^{-10}m. What is the energy difference between the two levels. From which this transition results. (DGK 2019)

Chapter 21

NUCLEAR PHYSICS

From Punjab Boards:

1) **Binding energy for deuteron nucleus is given by:** (LHR 2015 GI)
   (a) 2.8 Mev (b) **2.23 Mev**
   (c) 2.28 Mev (d) 2.25 Mev
2) **Which of the following are elementary particles:** (LHR 2012)
   (a) Protons (b) Neutrons
   (c) **Photons** (d) Mesons
3) **Two down and one up quarks make:** (LHR 2015 GI)
   (a) Proton (b) **Neutron**
   (c) Photon (d) Positron
4) **By emitting β – particle and γ – particle simultaneously the nucleus change its charge by:** (LHR 2012) (MUL 2014)
   (a) Losses by 1 (b) **Increases by 1**
   (c) Increases by 2
   (d) No change will be observed
5) **Which particle has larger range in air:** (LHR 2015 GI)
   (a) α – particles (b) **γ – particle**
   (c) β – particle (d) Neutron
6) **The building blocks of protons and neutrons are called:** (LHR 2016)
   (a) Ions (b) Electrons
   (c) Positrons (d) **Quarks**
7) **The number of protons in any atom are always equal to the number of:** (LHR 2016)
   (a) Neutrons (b) **Electrons**
   (c) Positrons (d) Mesons
8) **Types of quarks are:** (LHR 2017)
   (a) 2 (b) 4
   (c) **6** (d) 8
9) **Radiations emitted by human body at normal temperature 37°C lies in:** (LHR 2017)
   (a) X-ray region (b) **Infra red region**
   (c) Visible region (d) Ultraviolet region
10) **The amount of energy required to break the nucleus is called is:** (LHR 2017)
   (a) Nuclear energy (b) Kinetic energy
   (c) Potential energy (d) **Binding energy**
11) **Energy liberated when one atom of $^{235}_{92}U$ undergoes fission reaction:** (LHR 2017)
   (a) 140 Mev (b) 28 Mev
   (c) **200 Mev** (d) 60 Mev

12) α – particle carries a charge (GUJ 2015)
(a) – C (b) + 2e
(c) –2e (d) no charge

13) When α – particle is emitted from any nucleus mass number ________ and its charge number ________. (GUJ 2012)
(a) increases by 2m, increases by 2
(b) decreases by 4, decreases by 2
(c) decreases by 4, increases by 2
(d) decrease by 4, decrease by 4

14) A proton consists of quarks which are (GUJ 2015)
(a) two up, one down (b) one up, two down
(c) all up (d) all down

15) Energy of each positron is given by (GUJ 2015)
(a) 2 Me V (b) 1.02 Me V
(c) 0.51 Me V (d) 5 Me V

16) A sample contain N radio active nuclei. After 4 half lives the number of nuclei decaye is (GUJ 2012)
(a) $\frac{N}{16}$ (b) $\frac{15N}{16}$
(c) $\frac{N}{8}$ (d) $\frac{7N}{8}$

17) Electrons are: (MUL 2015 GII)
(a) Hadrons **(b) Leptons**
(c) Quarks (d) Baryons

18) On unified mass scale, 1 u equals: (MUL 2012 Supply)
(a) 12g (b) 1.66×10^{-12} g
(c) 1.66×10^{-27} Kg (d) 1.66×10^{-12} Kg

19) Half life of Uranium – 239 is: (MUL 2016)
(a) 26.5 minutes (b) 24.5 minutes
(c) 25.5 minutes **(d) 23.5 minutes**

20) The dead time of Geiger-Muller Counter is of the order of: (MUL 2014 GI)
(a) Micro second (b) Millisecond
(c) More than millisecond
(d) Nanosecond

21) Which nuclear reaction takes place in the sun and stars? (MUL 2013)
(a) Fission (b) Chemical
(c) Fusion (d) Mechanical

22) Which one is a better shield against γ-rays? (MUL 2012 Supply)
(a) Wood **(b) Lead**
(c) Aluminium (d) Water

23) Half life of U – 238 is: (MUL 2015 GI)
(a) 2.5×10^9 years (b) 3.5×10^9 years
(c) 4.5×10^9 years (d) 5.5×10^9 years

24) A particle is made up of two up quarks and one down quark is: (MUL 2012)
(a) Proton (b) Neutron
(c) Boson (d) Lepton

25) The particles equal in mass or greater than protons are called: (MUL 2012 GI)
(a) Baryons (b) Hadrons
(c) Fermions (d) Mesons

26) Fission chain reaction is controlled by: (MUL 2016)
(a) Cadmium rods (b) Iron rods
(c) Platinum rods (d) Steel rods

27) Number of isotopes of Neon gas are: (MUL 2017)
(a) 2 **(b) 3**
(c) 4 (d) 1

28) In Beta – decay ________ reaction takes place: (MUL 2017)
(a) ${}^{1}_{0}n \rightarrow {}^{1}_{1}H + {}^{0}_{-1}e$ (b) ${}^{3}_{1}H \rightarrow {}^{1}_{0}n + {}^{0}_{-1}e$
(c) ${}^{1}_{0}n \rightarrow {}^{2}_{1}H + {}^{0}_{-1}e$ (d) ${}^{1}_{0}n \rightarrow {}^{1}_{1}H + {}^{0}_{-1}e$

29) Binding energy per nucleon is maximum for: (MUL 2017)
(a) Platinum **(b) Iron**
(c) Uranium (d) Lead

30) The particles equal or greater in mass than that of protons is called: (MUL 2017)
(a) Baryons (b) Leptons
(c) Mesons (d) Quarks

31) The mass of Beta Particle is equal to mass of: (BAH 2014) (FAS 2016)
(a) Proton **(b) Electron**
(c) Neutron (d) Photon

32) A position is an anti-particle of: (BAH 2014)
(a) Proton **(b) Electron**
(c) Neutron (d) Photon

33) The charge on an Alpha Particle is equal to: (BAH 2015)
(a) +e (b) –e
(c) 2e (d) –2e

34) Which of the following has no charge: (BAH 2014)
(a) Alpha rays (b) Beta rays
(c) Gamma rays (d) Cathode rays

35) In a fast (nuclear) reactor a ${}^{238}_{92}U$ nucleus absorbs a fast neutron and is ultimately transformed into ...... by emitting two β particles; (BAH 2012)
(a) ${}^{235}_{92}U$ (b) ${}^{239}_{94}Pu$
(c) ${}^{208}_{82}Pb$ (d) ${}^{232}_{90}Th$

36) A pair of Quark and Anti Quark makes a: (BAH 2014) (DGK 2014)
(a) Meson (b) Hardon
(c) Lepton (d) Baryon

37) Colour Television (while operating) emits: (BAH 2012)

(a) α – rays (b) β – rays
(c) γ– rays (d) x – rays

38) Subatomic Particles are divided into groups: (BAH 2016)

(a) Photon (b) Leptons
(c) Hadrons (d) All these

39) When Nitrogen is bombarded by Alpha Particles, Nitrogen Nucleus change into: (BAH 2016)

(a) Oxygen (b) Carbon
(c) Berium (Be) (d) Helium (He)

40) The velocity at which the mass of a body become double is: (BAH 2016)

(a) $\frac{\sqrt{3}}{2}C$ (b) $\frac{2}{\sqrt{3}}C$
(c) $\frac{\sqrt{3}}{2}$ (d) C

41) Half-life of a radioactive element $T_{1/2}$ is given by: (FAS 2015, 2016)

(a) 0.693λ (b) $\frac{0.693}{\lambda}$
(c) $\frac{\lambda}{0.693}$ (d) $\frac{1}{0.693\lambda}$

42) γ-rays emitted from radioactive element have speed: (FAS2014)

(a) $1 \times 10^7\ ms^{-1}$ (b) $1 \times 10^8\ ms^{-1}$
(c) $3 \times 10^8\ ms^{-1}$ (d) $4 \times 10^9\ ms^{-1}$

43) The amount of energy equivalent to 1 a.m.u. is: (FAS 2015)

(a) 931 MeV (b) 93.15 MeV
(c) 9.315 MeV (d) 2.224 MeV

44) Geiger counter can be used to detect: (FAS 2012)

(a) Charge (b) Mass
(c) $\frac{\text{Carge}}{\text{Mass}}$ ratio (d) Nuclear radiation

45) The number of types of quarks are: (FAS 2016)

(a) 6 (b) 5
(c) 4 (d) 3

46) The charge on the β particle is: (FAS 2017)

(a) +e (b) +2e
(c) –e (d) None of these

47) The particles equal in mass or greater than proton are: (RAW 2014)

(a) Mesons (b) Baryons
(c) Leptons (d) Hadrons

48) How many times, the α-Particle is more massive than electron? (RAW 2017)

(a) 6332 (b) 7332
(c) 8332 (d) 9332

49) Gm-counter uses: (RAW 2017)

(a) Alcohol only (b) Bromine
(c) Argon (d) Neon and bromine

50) Which of the following belong to "hadrons" group: (SAG 2012)

(a) Proton (b) Electron
(c) Muons (d) Neutrinos

51) A high potential difference of _______ is used in G.M counter: (SAG 2013 GI)

(a) 400 volts (b) 1000 volts
(c) 5000 volts (d) 4000 volts

52) In Wilson cloud chamber, we used: (SAG 2013 GI)

(a) Alcohol vapours (b) neon gas
(c) Bromine gas (d) Water vapours

53) Which one is most energetic: (SAG 2013 GI)

(a) γ-rays (b) X-rays
(c) Ultra violet rays (d) Visible light

54) An α=Particle contains: (SAG 2012)

(a) "1" proton and "1" neutron
(b) "2" protons and "2" neutrons
(c) "3" protons and "3" neutrons
(d) "4" protons and '4" neutrons

55) The energy released by fusion of two deuterons into a Helium nucleus is about: (SAG 2013 GII)

(a) 24 Mev (b) 200 Mev
(c) 1.02 Mev (d) 7.2 Mev

56) When a nucleus emits alpha particle, its atomic mass decreases by. (SAG 2017) (DGK 2015)

(a) 1 (b) 2
(c) 3 (d) 4

57) In nuclear radiations, track of $\propto$ particle is (SAG 2017)

(a) Thin (b) Discontinuous
(c) Erratic (d) Continuous

58) Mass of proton is (SAG 2017)

(a) 1.67×10^{-27} kg (b) 1.6×10^{-19} kg
(c) 1.67×10^{-31} kg (d) 9.1×10^{-31} kg

59) The particles equal in mass or greater than protons are called: (DGK 2013 GII)

(a) Leptons (b) Baryons
(c) Mesons (d) Mouns

60) The quantity of $^{235}_{92}U$ in the naturally occuring uranium is: (DGK 2014 GI)
(a) 0.2% (b) 0.3%
(c) 0.7% (d) 4%

61) Energy needed to produce an electron – hole pair in solid state detector is: (DGK 2015 GII)
(a) 1 to 2 ev (b) 3 to 4 ev
(c) 6 to 7 ev (d) 8 to 9 ev

62) Dr. Abdus Salam was awarded Nobel Prize for unification of: (DGK 2016)
(a) Gravitational force and weak nuclear force
(b) Strong nuclear force and weak nuclear force
(c) Electromagnetic force and strong nuclear force
(d) Electromagnetic force and weak nuclear force

63) Particles that experience the strong nuclear force: (DGK 2012 GII)
(a) Hadrons (b) Leptons
(c) Photons (d) Quarks

64) Half life of radon gas is: (DGK 2015 GI)
(a) 3.8 minutes (b) 3.8 days
(c) 3.8 months (d) 3.8 years

65) By emitting α particle, the nucleus losses its mass by: (DGK 2014 GII)
(a) 1 amu (b) 2 amu
(c) 3 amu (d) 4 amu

66) Both Xenon and cesium have: (DGK 2015 GI)
(a) 33 isotopes (b) 34 isotopes
(c) 35 isotopes (d) 36 isotopes

67) the ionizing power of β particle is:(DGK 2014 GII)
(a) Equal to α particle (b) Equal to γ particles
(c) Greater than α particle
(d) Less than αparticles

68) Curie is large unit which equals to .... disintegration per second; (DGK 2012 GII)
(a) 3.7×10^{10} (b) 3×10^{8}
(c) 3.7×10^{8} (d) 3×10^{6}

69) A device that shows the visible path of ionizing particle is called: (DGK 2017)
(a) GM Counter (b) Solid state detector
(c) Scalar (d) Wilson Cloud Chamber

70) By emitting β-particle and γ-particle simultaneously the nucleus changes its charge by: (DGK 2017)
(a) –1 (b) +1
(c) –2 (d) +2

71) Which pair belongs to Hadrons: (DGK 2017)
(a) protons and neutrons
(b) neutrons and electrons
(c) photons and electrons
(d) positrons and electrons

72) Rest mass of photon is: (DGK 2017)
(a) equal to electron (b) zero
(c) equal to proton (d) equal to neutron

73) Energy released by conversion of 1 amu is: (DGK 2017)
(a) 1.6×10^{-19} ev (b) 1.6×10^{-19} Mev
(c) 200 Mev (d) 931 Mev

74) When a nucleus emits α-particles, its mass number drops by: (SAW 2013)
(a) 1 (b) 2
(c) 4 (d) 6

75) At higher energies more than 1.02 Mev, the dominant process is: (SAW 2014)
(a) Compton scattering (b) Pair production
(c) Photo electric effect (d) Annihilation

76) Radioactivity happens due to disintegration of: (SAW 2013)
(a) Nucleus (b) Mass
(c) Electrons (d) Protons

77) The average of the background radiation to which we are exposed: (SAW 2014)
(a) 2 mSv (b) 1 mSv
(c) 2 mSv (d) 0.01 Sv

78) 1 a.m.u. is equal to: (SAW 2016)
(a) 1.66×10^{-19} kg (b) 1.66×10^{-24} kg
(c) 1.66×10^{-27} kg (d) 1.66×10^{-34} kg

79) The half life of Radon is: (LHR 2018)
(a) 23.5 minutes (b) 3.8 days
(c) 1620 years (d) 4.5×10^{9} years

80) Nuclear fission chain reaction is controlled by using: (LHR 2018)
(a) Steel rods (b) Graphite rods
(c) Cadmium rods (d) Platinum rods

81) Hydrogen bomb is an example of: (MUL 2018)
(a) Nuclear fission (b) Nuclear fusion
(c) Chain reaction (d) Chemical reaction

82) The half-life of radon gas is: (MUL 2018)
(a) 3.8 hours (b) 3.8 minutes
(c) 3.8 days (d) 3.8 years

83) Various types of cancer are treated by:(MUL 2018)
(a) Carbon - 14 (b) Nickel – 63
(c) Cobalt – 60 (d) Strontium – 90

84) A pair of quark and anti makes a: (BAH 2018)
(a) Meson (b) Baryon
(c) Lepton (d) Hadron

85) If we have No number of atoms of any Radioactive Element, then after four half lives: (BAH 2018)
(a) $\frac{1}{4}N_0$ (b) $\frac{1}{8}N_0$
(c) $\frac{1}{16}N_0$ (d) $\frac{1}{2}N_0$

86) In liquid Metal Fast Breeder reactor, the type of Uranium used is: (BAH 2018)
(a) $^{235}_{92}U$ **(b) $^{238}_{92}U$**
(c) $^{234}_{92}U$ (d) $^{239}_{92}U$

87) Radiation produced from TV picture tube is: (FAS 2018)
(a) Gamma rays **(b) X-rays**
(c) Infrared light (d) Ultra violet light

88) The bombardment of nitrogen with α-particle will produce: (FAS 2018)
(a) Neutron **(b) Proton**
(c) Electron (d) Positron

89) By emitting β – particle and γ – particle simultaneously, the nucleus changes its charge by: (SAG 2018)
(a) – 1 (b) + 1
(c) – 2 (d) + 2

90) Slow neutrons can cause fission is: (SAG 2018)
(a) Uranium – 235 (b) Uranium – 238
(c) Neptonium (d) Lithium

91) The amount of energy equivalent to 1 am. m.u is: (SAG 2018)
(a) 0.315 MeV (b) 93.15 MeV
(c) 931.00 Mev (d) 0.931 Mev

92) The force which is responsible for the breaking up of the radioactive element, is: (DGK 2018)
(a) Weak nuclear force
(b) Strong nuclear force
(c) Electromagnetic force
(d) Gravitational force

93) The dead time for G.M counter is of the order of: (DGK 2018)
(a) 10^{-1} S (b) 10^{-2} S
(c) 10^{-3} S **(d) 10^{-4} S**

94) The particles which do not experience strong force are called: (DGK 2018)
(a) Baryons (b) Hadrons
(c) Mesons **(d) Leptons**

95) The γ-rays emitted from radioactive element have speed: (DGK 2018)
(a) 1×10^7 ms^{-1} (b) 1×10^8 ms^{-1}
(c) 3×10^8 ms^{-1} (d) 4×10^9 ms^{-1}

96) A proton consists of quarks which are: (SAH 2018)
(a) 2 up, 1 down (b) 1 up, 2 down
(c) All up (d) All down

97) The binding energy per nucleon is maximum for: (LHR 2019 GI)
(a) Hydrogen (b) Nitrogen
(c) Uranium **(d) Iron**

98) Number of neutrons in $^{235}_{92}U$: (LHR 2019 GI)
(a) 92 (b) 235
(c) 143 (d) 327

99) In the reaction, X + $^{17}_{8}O \rightarrow ^{14}_{7}N + ^{4}_{2}H_e$, X is: (RAW 2019 GI)
(a) $^{1}_{1}H$ (b) $^{2}_{1}H$
(c) $^{0}_{1}e$ (d) $^{0}_{-1}e$

100) Subatomic particles are divided into: (MUL 2019 GI)
(a) Six groups (b) Five groups
(c) Four groups **(d) Three groups**

101) Types of quarks are: (SAG 2019 GI)
(a) 2 (b) 4
(c) 6 (d) 8

102) In liquid metal fast breeder reactor the type of uranium used is: (SAG 2019 GI)
(a) $^{235}_{92}U$ **(b) $^{238}_{92}U$**
(c) $^{234}_{92}U$ (d) $^{239}_{92}U$

103) A pair of quark and antiquark makes a: (DGK 2019 GI)
(a) Baryon (b) Lepton
(c) Muon **(d) Meson**

104) 0.1 Kg mass will be equivalent to energy: (DGK 2019 GI)
(a) 5×10^8 J **(b) 9×10^{15} J**
(c) 6×10^{16} J (d) 9×10^{16} J

105) The specially designed solid state detector can be used to detect: (DGK 2019 GI)
(a) α-rays only (b) β-rays only
(c) γ-rays only (d) X-rays only

106) Binding energy per nucleus is maximum for: (SAW 2019 GI)
(a) Helium **(b) Iron**
(c) Radium (d) Polonium

107) Half life of radium-226 is: (SAW 2019 GI)
(a) 1620 years (b) 3.8 days
(c) 2.5 days (d) 23.5 minutes

ENTRY TEST MCQ'S

1) What is emitted by a hot metal filament in a cathode ray tube? (2008)
(a) X-ray (b) Proton
(c) Electron (d) Photon

2) Beta ray emitted by a radioactive substance is: (2008)
(a) An electron which was existing outside the nucleus.
(b) An electron which was existing inside the nucleus.
(c) An electron emitted by the nucleus as a result of the decay of neutron inside the nucleus.
(d) A pulse of electromagnetic wave.

3) The neutron is assumed to be made of: (2008)
(a) On up quark and two down quarks
(b) Two up quarks and two down quarks
(c) Two up quarks and down down quark
(d) One up quark and down quark

4) Which device is the most efficient? (2008)
(a) Nuclear reactor (b) Stoarge battery
(c) Silicon solar cell (d) Dry battery cell

5) Which one is most stable element on the basis of binding energy? (2008)
(a) Sn (b) Ba
(c) Kr (d) Fe

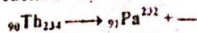
6) The cobalt is absorbed by: (2008)
(a) Bones (b) Liver
(c) Skin (d) Thyroid gland

7) A certain radioactive mass decays from 64 gm to 2 gm in 20 days. What is its half-life? (2008)
(a) 5 days (b) 4 days
(c) 10 days (d) 6 days

8) The emission of γ-radiations from the nucleus is generally represented by the equation: (2009)
(a) ${}^{A}_{Z}X \rightarrow {}^{A}_{Z}X$ + γ-radiations
(b) ${}^{A}_{Z}X \rightarrow {}^{A}_{Z}X$ + β-particles
(c) ${}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}X$ + γ-radiations
(d) ${}^{A}_{Z}X \rightarrow {}^{A}_{Z}X$ + γ-radiations

9) In the half-life of an element, the equation for the number of decaying atoms is given by: (2010)
(a) $\Delta N \propto -N\Delta t$ (b) $\Delta N \propto = KN\Delta t$
(c) $\Delta N \propto -n\Delta t$ (d) $\Delta N \propto = -\Delta N\Delta t$

10) The SI unit of absorbed dose 'D' i.e. radiation effect is Gray and one Gray is equal to: (2010)
(a) kJ / mol (b) J / mol
(c) kg / J (d) J / kg

11) Which one of the following emission takes place in a nuclear reaction?
$_{90}Th_{234} \longrightarrow {}_{91}Pa^{232} + \text{—}$
(a) alpha (b) Gamma
(c) Beta (d) Photons

12) Decay constant 'λ' is given as (2010)
(a) $-\frac{\Delta N/N}{\Delta t}$ (b) $-\frac{\Delta N}{\Delta t}$
(c) $-\frac{N}{\Delta t}$ (d) $-\frac{\Delta N/N}{\Delta t}$

13) Which of following is used to estimate the circulation of blood in a patient? (2011)
(a) Carbon-14 (b) Carbon-12
(c) Phosphorus-32 (d) Sodium-24

14) Half-life of a radioactive element is: (2011)
(a) Inversely proportional to square of decay constant
(b) Directly proportional to square of decay constant
(c) Directly proportional do decay constant
(d) Inversely proportional to decay constant

15) The ratio of the rate of decay of a parent atom to the number of radioactive nuclei present at that time is equal to: (2011)
(a) Half-life of radioactive element
(b) Mean life
(c) Decay constant of radioactive element
(d) Activity if radioactive element

16) For the radiotherapy of a patient, it is required to double the absorbed dose in gray. What step must be taken? (2011)
(a) Energy must be quadrated
(b) Energy must be halved
(c) Energy must be raised four times
(d) Energy must be doubled

17) Ionizing capability of gamma rays is: (2011)
(a) Equal to alpha and beta particle
(b) Less than alpha but greater than beta particles
(c) Less than both alpha and beta particles
(d) Less than beta but greater than alpha particles

18) Which one of the following particle is emitted as a result of nuclear reaction? (2011)
$Ra^{226} \longrightarrow Rn^{222}$
(a) Beta (b) Alpha
(c) Gamma rays (d) One alpha and one beta

19) The transformation of a neutron into proton in the nucleus gives rise to emission of: (2011)
(a) Beta particles (b) Alpha particels
(c) Gamma particles (d) X-rays

20) What is the charge on alpha particles emitted during the phenomenon of radioactivity? (2012)
(a) +e (b) −e
(c) −2e (d) +2e

21) A radioactive nuclide decays by emitting an alpha particle, a beta particle and a gamma ray photon, the change in the nucleon in the nucleon number will be: (2012)

(a) –4 (b) –1
(c) –2 (d) –3

22) A half-life of sodium-24 is _________ which is used to estimate the volume of blood in a patient: (2012)

(a) 6 hours (b) 15 hours
(c) 8 hours (d) 15 days

23) Which of the following is unit of absorbed dose? (2012)

(a) Sievert (b) Gray
(c) Roentgen (d) Curie

24) Which of the following effect is observed due to emission of β– during the phenomenon of radioactivity? (2012)

(a) A increases by 1 and Z remains same
(b) Z increases by 1 and A remains same
(c) Z decreases by 1 and A remains same
(d) A decreases by 1 and Z remains same

25) The isotope of Iodine-131 is used in the treatment of: (2012)

(a) Blood cancer (b) Bone cancer
(c) Lung tumor **(d) Thyroid cancer**

26) Isotopes are those nuclei of an element that have: (2013)

(a) Same mass number but different atomic number
(b) Same mass number as well as atomic number
(c) Different mass number as well as atomic number
(d) Same atomic number but different mass number

27) Emission of alpha decay from a radioactive substance causes? (2013)

(a) Decreases in 'Z' by 4 and decreases in 'A' by 2
(b) Decreases in 'A' by 1 and 'Z' remains same
(c) Decreases in 'Z' by 1 and 'A' remains same
(d) Decreases in 'A' by 4 and decreases in 'Z' by 2

28) In cloud chamber the path of β-particles is: (2013)

(a) Straight, thick, short (b) Thin, wavy, shorter
(c) Thin, wavy, longer (d) Thin, straight, short

29) Among the three types of radioactive radiation, which have strongest penetration power? (2013)

(a) Alpha **(b) Gamma**
(c) Beta
(d) All have same penetration power

30) 10 Joule of energy is absorbed by 10-gram mass from a radioactive source. What is the absorbed dose? (2013)

(a) 1 gray **(b) 1000 gray**
(c) 10 gray (d) 100 gray

31) Emission of radiation from radioactive substance is: (2013)

(a) Dependent on both temperature and pressure
(b) Independent of temperature but dependent on pressure
(c) Independent of both temperature and Pressure
(d) Independent of pressure but dependent on temperature

32) Which one of the following isotopes of Iodine is used for the treatment of thyroid cancer? (2014)

(a) I - 113 (b) I - 120
(c) I - 131 (d) I - 140

33) What is the absorbed does 'D' of a sample of 2 kg which is given an amount of 100 J of radioactive energy? (2014)

(a) 200 Gy (b) 102 Gy
(c) 50 Gy (d) 98 Gy

34) Which one of the following has the largest energy content? (2014)

(a) γ-rays (b) X-rays
(c) Infra-red radiations (d) Ultra-violet radiations

35) A beta (β) particle is a fast moving electron. During a β – decay how the atomic number and mass number of a nucleus change? (2014)

	Atomic Number	Mass Number
a)	Remains the same	Increases by one
b)	Increases by one	Decreases by two
c)	**Increases by one**	**Remains the same**
d)	Decreases by two	Decreases by four

36) A uranium isotope $^{232}_{92}U$ undergoes one α–decay and one $^{0}_{-1}$β–decay. What is the final product? (2014)

(a) 90 **(b) 92**
(c) 89 (d) 88

37) A naturally occurring radioactive element decays two alpha particles. Which one of the following represents status of daughter element with respect to mass number 'A' and charge number 'Z'? (2014)

(a) 'Z' decreases by 4 ad 'A' decreases by 2
(b) 'Z' decreases by 2 and 'A' decreases by 4
(c) 'Z' decreases by 4 and 'A' decreased by 8
(d) 'Z' decreases by 8 and 'A' decreases by 4

38) In the reaction, $^{234}_{92}Th \rightarrow\ ^{234}_{91}Y +\ ^{0}_{-1}e$ the electron e emits from the: (2015)

(a) 1st Orbit (b) 2nd Orbit
(c) Nucleus (d) Valence Shell